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RICKENBACKER AIR NATIONAL GUARD BASE
COLUMBUS, OHIO

PRE-CLOSURE SAMPLING REPORT
HAZARDOUS WASTE STORAGE AREA

VOLUME I

FINAL

MARCH 1992

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An investigation was conducted at the Rickenbacker Air National Guard Base Hazardous Waste Storage Area (HWSA) (Building 560). The base is located in Columbus, Ohio. Sampling was conducted in accordance with the Ohio Environmental Protection Agency regulations on closures of HWSAs. The field activities were completed March 1989. The results of this investigation are presented in the subject document. As a result of this investigation additional investigations were recommended for this site in order to determine the extent of soil and ground water contamination.

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PRE-CLOSURE SAMPLING REPORT

RICKENBACKER AIR NATIONAL GUARD BASE
Columbus, Ohio

FINAL

Volume I

MARCH 1992

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ACRONYMS

AAS	Atomic Absorption Spectrophotometer
AFRES	Air Force Reserve
ANG	Air National Guard
ANGB	Air National Guard Base
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing Materials
BAT	Best Available Technology
BCT	Best Conventional Technology
BTX	Benzene, Toluene and Xylene
°C	degrees Centigrade
CCC	Calibration Check Compounds
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CRDL	Contract Required Detection Limit
CRQL	Contract Requirement Quantitation Limit
DD	Decision Document
DNR	Department of Natural Resources
DOD	Department of Defense
DOE	Department of Energy
DQO	Data Quality Objectives
EC	Electrical Conductivity
ES	Engineering-Science, Inc.
eV	Electron Volt
°F	degrees Fahrenheit
FS	Feasibility Study
FFS	Focused Feasibility Study
GC	Gas Chromatograph
GC/MS	Gas Chromatography/Mass Spectrometry
HAL	Health Advisory Limit
HSP	Health and Safety Plan
HARM	Hazard Assessment Rating Methodology
HAS	Hazard Assessment Scores
HAZWRAP	Hazardous Waste Remedial Action Program
HMTC	Hazardous Materials Technical Center
HWSA	Hazardous Waste Storage Area
ICP	Inductively Coupled Plasma Emission Spectrometer
ID	Inside Diameter
IRP	Installation Restoration Program
LQAC	Laboratory Quality Assurance Coordinator

SECTION 1.0
EXECUTIVE SUMMARY

This report documents the activities and findings of field investigations conducted at the Hazardous Waste Storage Area (HWSA) at Rickenbacker Air National Guard Base (ANGB) between January and March 1990. The purpose of this investigation is to deny or determine the presence of chemical contamination in the surface sediment, soil and groundwater at the HWSA, assess the potential risks to the environment and human health, and determine actions that will allow a closure to the HWSA.

Rickenbacker ANGB is located twelve miles southeast of Columbus, Ohio. The facility has been in operation since the early 1940's in support of training and air-to-air refueling missions. Reciprocating and jet engined aircraft have been operated out of the facility.

The HWSA at Rickenbacker ANGB consists of Building 560 and the Drum Storage Area southeast of the building. It has been a under a Part A Permit for hazardous waste storage since 1983. The facility was last used in September 1986. The Drum Storage Area adjacent to Building 560 had been used to store liquid wastes such as spent solvents, cleaning fluids, acids and paint strippers. There are four 25,000 gallon steel underground storage tanks (USTs) adjacent to the HWSA that have been in use for almost 40 years. Two tanks currently store de-icing fluid. JP-4 jet fuel, and recyclable oil were historically stored in the other two tanks.

Activities conducted during the pre-closure sampling included surface soil sampling, shallow and deep soil sampling by boring, installation of groundwater monitoring wells and groundwater sampling.

All work conducted at the HWSA was done in accordance to the Pre-Closure Sampling Plan (December 1989) with site activities being complete by March 1989.

The surficial (<30' below grade) unconsolidated materials are similar throughout Rickenbacker ANGB and the HWSA. The uppermost ten feet is typically a brown silty clay, with trace amounts of small pebbles. From ten to approximately fifteen feet is silty/sandy clay. A saturated sand is encountered at approximately 15 feet. Water from this sand rises in wells to eight to ten feet below grade. This is underlain by a thin ($\leq$1')

layer of hard, dense gray clay over brown to gray sand and gravel. The hydraulic gradient is in a general southerly direction.

Surface and shallow soil within and adjacent to the HWSA are contaminated with metals, semi-volatile organic compounds and volatile organic compounds (VOCs). The extent and concentration of contaminants generally decrease with depth. The exception to that generalization is the contamination of the shallow aquifer with phase-separated hydrocarbons, dissolved fuel components and halogenated VOCs with only trace concentrations in the shallow soil.

Specific metals that were found in the soil and groundwater at the site are: arsenic, beryllium, cadmium, lead, thallium and zinc with isolated occurrences of silver and mercury. Detectable semi-volatile organics were found at levels up to 164,300 μg/kg, concentrating mainly in the upper two feet of the soil and toward the western area of the site. No semi-volatile organics were detected in the groundwater. Detectable volatile organics in the soil and groundwater included: benzene, ethylbenzene, methylene chloride, and xylenes with more isolated occurrences of trichloroethene, toluene, acetone, vinyl chloride and trans-1,2-dichloroethene. Benzene and trichloroethene were detected in groundwater at concentrations above the maximum contaminated level (MCL) for drinking water.

The varied and extensive contamination detected preclude the affecting of a "clean" closure of the HWSA. The extent of the downgradient groundwater contamination and some surface soil contamination is not well defined.

Additional investigation is warranted to determine the extent of contamination. Based on results of the additional investigation revisions to the Closure Plan will need to be made to complete a "landfill" closure. The revised closure should include some combination of isolation, removal or capping of the contaminated soil and remediation of the groundwater problem.

SECTION 2.0

BACKGROUND

2.1 BASE BACKGROUND

The Rickenbacker ANGB is located 12 miles southeast of Columbus, Ohio and 0.5 miles east of the Village of Lockbourne (Figure 2.1). The Base currently covers approximately 2,100 acres. Ownership of portions of the Base have been transferred from the U.S. Air Force to the Rickenbacker Port Authority (RPA) since 1982. The RPA property is used for private aircrafts. The Base occupies a plateau separating the Big Walnut and Walnut Creek Drainage Basins. Approximate elevation of the Base is 740 feet (MSL).

Rickenbacker ANGB, known as Lockbourne Air Force Base until 1974, was officially activated as the Northeastern Training Center, Army Air Corps, in 1942 and was used as a training center for glider pilots. In 1943, glider training was discontinued and a school for B-17 pilots was established at the Base.

In 1949, the Base was deactivated by the Air Force and used for 18 months as an Ohio ANG training base until 1951, when the Base was transferred to the Strategic Air Command (SAC) and reactivated as an Air Force Base in response to the Korean Conflict. In 1958, the 301st Bombardment Wing moved to the Base. In June 1964, the 301st Bombardment Wing was redesignated as the 301st Air Refueling Wing and began flying KC-135 Strato Tankers out of the Base. The SAC refueling mission of the 301st Air Refueling Wing is continued today at Rickenbacker by the 160th Air Refueling Group of the Ohio ANG, which moved to the Base in 1972. In July 1965, the 840th Air Division of the Tactical Air Command moved to Rickenbacker with its C-130 Hercules Cargo Aircraft and took command of the Base. In 1971, command of the Base was again transferred to SAC under the 301st Air Refueling Wing. Also in 1971, the Air Force Reserve's (AFRES) 302nd Tactical Airlift Wing (TAW) moved to Rickenbacker from the Clinton County Air Base. The 302nd TAW flew C-130A cargo planes in support of their airlift mission. In 1981, the 302nd TAW vacated Rickenbacker ANGB, and its units were converted to the 907th Tactical Airlift Group (TAG) (AFRES). The aircraft currently being used by the 907th TAG is the C-130E. The 907th Aerial Spray Branch, under the 907th TAG, is responsible for aerial pesticide spraying missions at

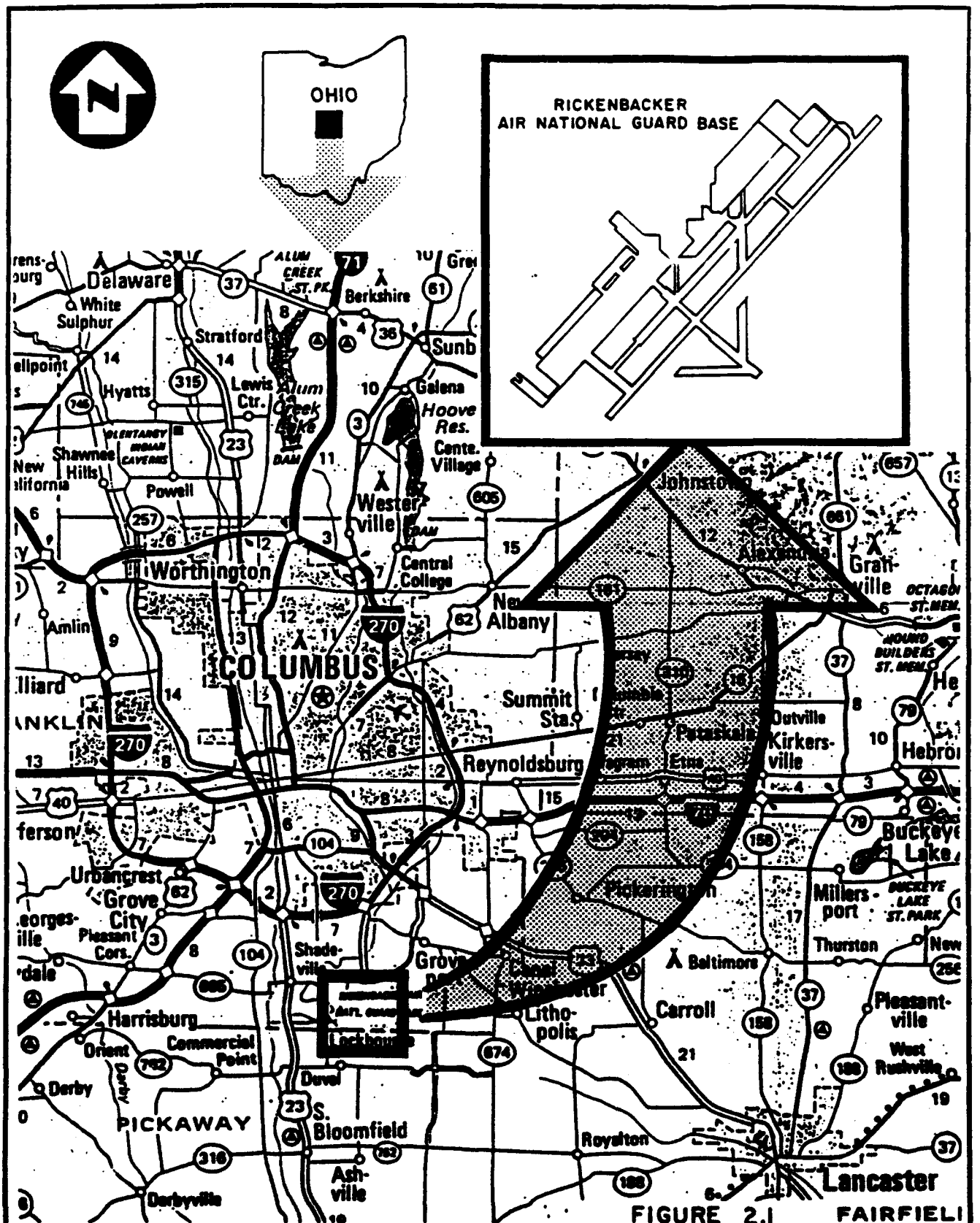


FIGURE 2.1 FAIRFIELI

LOCATION MAP
RICKENBACKER AIR NATIONAL GUARD BASE

other bases around the country. Pesticides used by the 907th Aerial Spray Branch are not stored or transported at Rickenbacker ANGB, but are supplied by the Base being sprayed. On 1 April 1980, Rickenbacker Air Force Base closed and the installation was turned over to the Ohio National Guard. At that time, an organization known as Detachment 1, OHANG was created to be the single manager for the military units stationed at Rickenbacker ANGB with the 121st Tactical Fighter Wing, 160th Refueling Group, and 907th Tactical Airlift Group being major tenants. In the fall of 1988, Detachment 1 was deactivated and the 121st TFW assumed host and single manager responsibilities under a sub unit known as the 121st COS (Consolidated Operating Support). The 121st TFW has been at Rickenbacker ANGB since 1949, previously flying F-100 Super Sabres and currently flying A7D Corsairs. As many as 5,000 people have worked on the Base in its history. Currently, 1,100 people are on the Base daily.

Land use adjacent to the Base is residential and agricultural. The houses and apartments in the northwest corner of the Base which were formerly occupied by Base personnel have been purchased by a private developer and are being rented and sold. The Base, former Base housing and the Village of Lockbourne use water supplied from Base water wells.

North of the Base lies open agricultural land with some residential development along Alum Creek Drive. East of the Base is agricultural land and residential development along the major roads. South of the Base is the former Base golf course which is now privately owned, trailer parks and widely spaced single-family homes. To the West is the Norfolk and Western and Chesapeake and Ohio railroad tracks, the abandoned Ohio Canal and the Village of Lockbourne with residential and light industrial development.

Future land use in adjacent areas will probably be residential and light industrial as the urban development of Columbus extends to the southeast.

2.2 HAZARDOUS WASTE STORAGE AREA

The HWSA at Rickenbacker ANGB consists of Building 560 and the Drum Storage Area southeast of the building. Figure 2.2 shows the HWSA location. The history of waste storage at the site and the results of previous investigations of the site are summarized below.

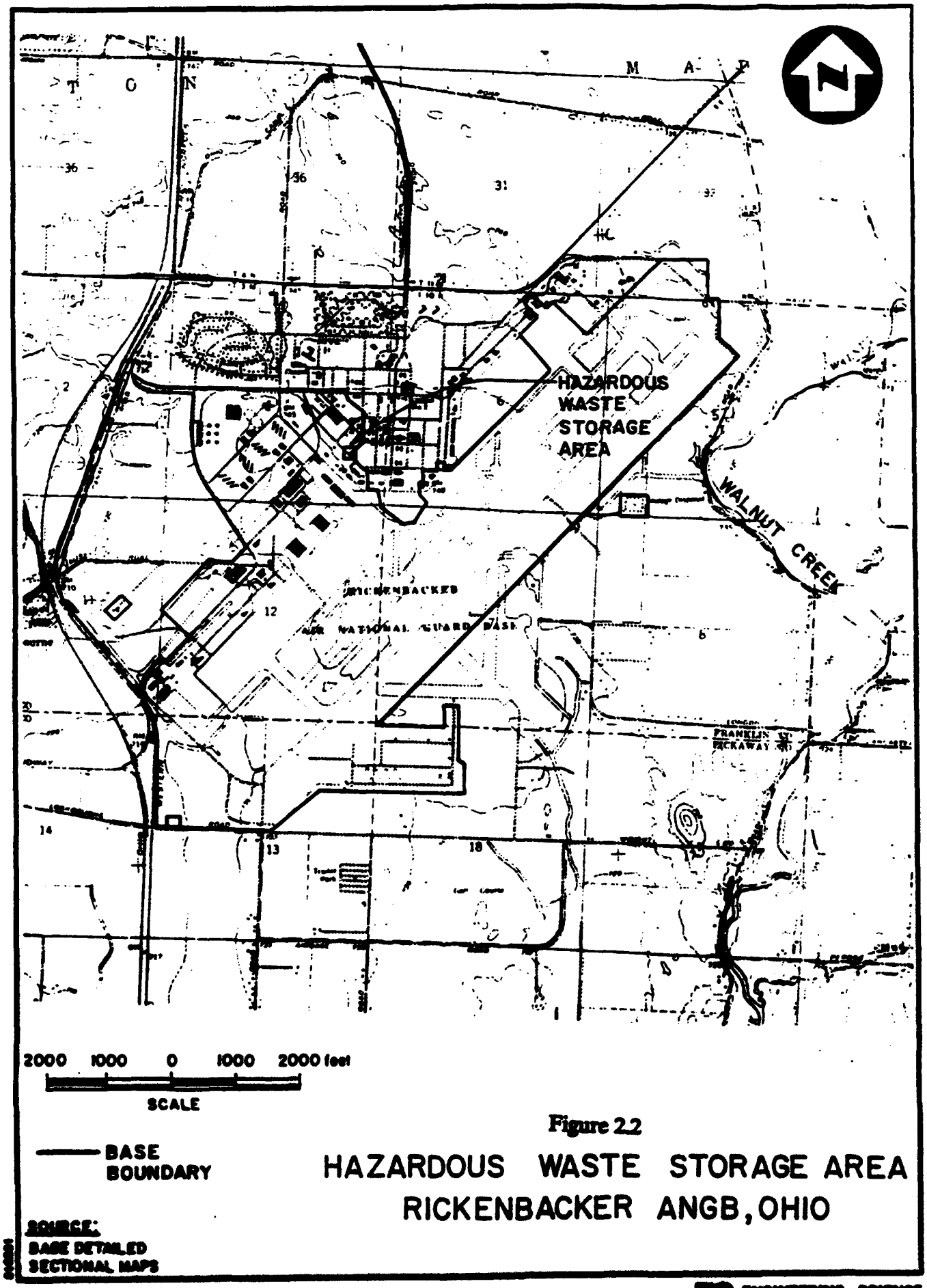


Figure 2.2

HAZARDOUS WASTE STORAGE AREA
RICKENBACKER ANGB, OHIO

2.2.1 History

The HWSA has been under a permit for hazardous waste storage since 1983. No waste has been stored at the facility since September 1986. The Drum Storage Area adjacent to Building 560 had been used to store drums containing liquid wastes such as spent solvents, cleaning fluids, acids and paint strippers. Small quantities of dry wastes such as spent desiccants were stored in Building 560.

Four 25,000 gallon steel underground storage tanks (USTs) adjacent to the HWSA have been in use for almost 40 years. Two of these tanks are still in use for the storage of non-hazardous de-icing fluid. The other two tanks were used to store oil and recyclable JP-4 jet fuel but have not been used since they were taken out of service in the latter part of 1988. The used oil storage tank was also used to store dielectric fluid which may or may not have contained PCBs. However, the tanks are not included in the HWSA permit. The only recorded loss from any of the storage tanks occurred in 1982, when a standpipe broke. No record of the amount of waste released is available.

2.2.2 Previous Investigations

The HWSA was identified as a potential source of contamination in a Preliminary Assessment (PA) of the Base conducted in 1987 (Hazardous Materials Technical Center [HMTC]. Based on the results of the PA, a site investigation was conducted. Engineering-Science (ES) completed the first phase of the field investigation of the HWSA in October 1988. The results of this investigation are discussed in detail in the ES Report Field Investigation Report - Hazardous Waste Storage Area: Rickenbacker Air National Guard Base, Columbus, Ohio (October 1990). A brief summary of the testing program and results follows. The results of the previous study were utilized in drawing conclusions for this report. Investigations at the site included a soil-gas survey, shallow and deeper soil sampling and the drilling and sampling of monitoring wells to investigate groundwater quality. Figure 2.3 shows the locations of samples made on the HWSA site. Table 2.1 is a legend for Figure 2.3.

A ten point soil-gas survey was conducted on 25 July 1988 which identified two areas with elevated concentrations of benzene, toluene and ortho-xylene (BTX). Concentrations of total BTX in the soil-gas samples ranged from undetectable to 29.8 ppm.

TABLE 2.1

UTILITY LEGEND FOR SITE PLANS

RICKENBACKER AIR NATIONAL GUARD BASE
COLUMBUS, OHIO

ABOVE GROUND UTILITIES AND FEATURES:

⫲⫲⫲	RAILROAD
O	MANHOLE
o	VALVE
—x—	FENCE
◉	RUNWAY / TAXIWAY LIGHT
Ω	FIRE HYDRANT
—H—	HEAT LINE
—JF—	JET FUEL LINE
△	ELECTRICAL TRANSFORMER
●	ELECTRIC SERVICE POLE

UNDERGROUND UTILITIES:

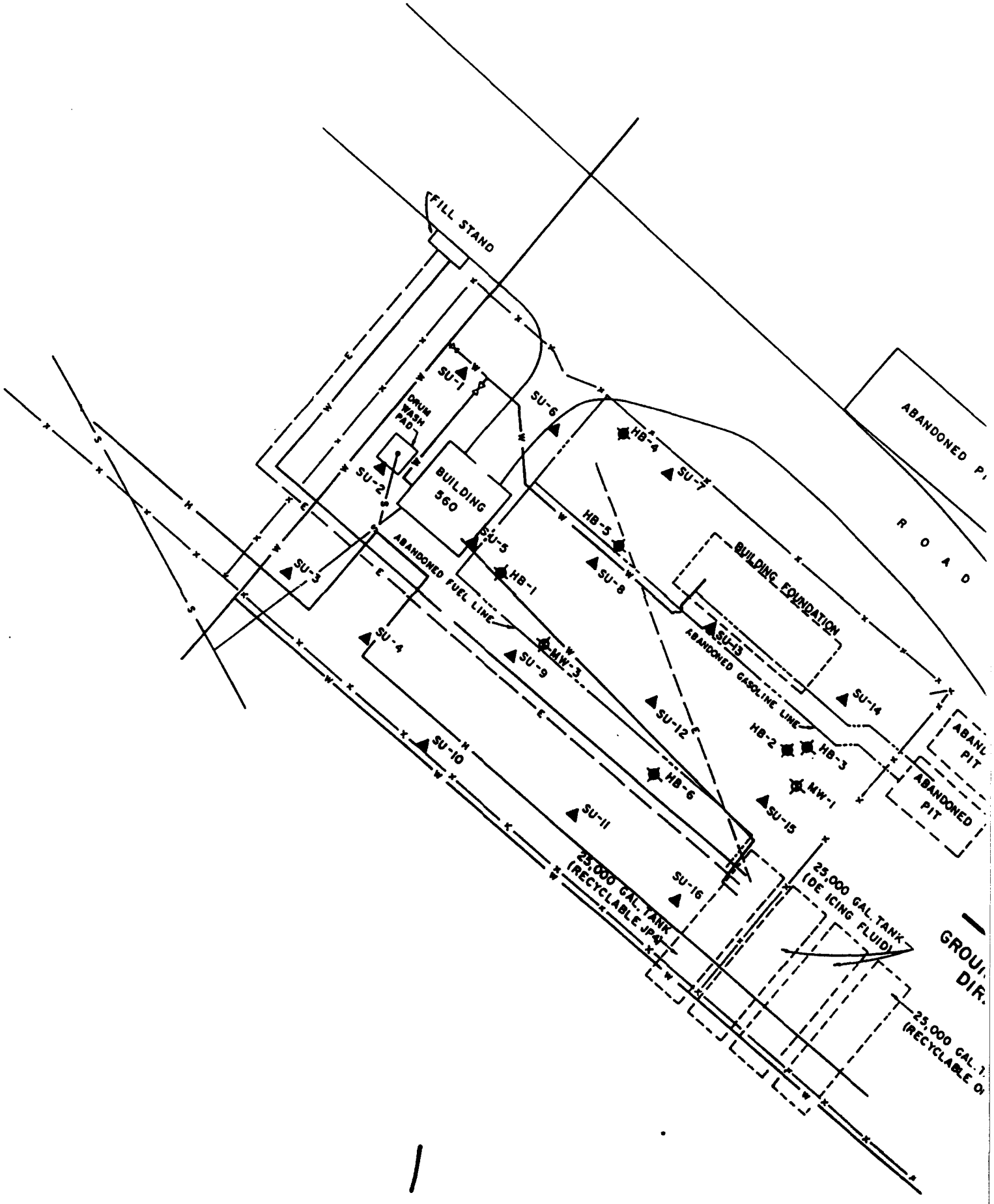
--H--	HEAT LINE
--JF--	JET FUEL LINE
--E--	ELECTRIC LINE
--T--	TELEPHONE LINE
—W—	WATER LINE
—S—	SANITARY SEWER
—SS—	STORM SEWER
□	JUNCTION BOX

Soil samples were collected from the 16 surface locations, 6 hand borings and 3 auger borings shown on Figure 2.3. Analyses indicated elevated semi-volatile organic and metals concentrations. The characteristics of the semi-volatile organics found were typical of coal-tar derivatives and phthalates. Metals identified included cadmium, chromium, copper, lead and zinc.

Three of the auger borings made during soil sampling were completed as monitoring wells in the shallow aquifer. Water samples from two of these wells exhibited volatile organic concentrations in excess of Federal Maximum Contaminant Levels (MCLs). Water from MW1 contained 94 μg/l benzene, 20 μg/l xylenes and 13 μg/l methylnapthalene. Water from MW3 contained 44 μg/l trichloroethene. Samples from all wells had total unfiltered metals concentrations in excess of Federal Drinking Water Standards for arsenic, cadmium, chromium and lead.

2.2.3 Pre-Closure Sampling Plan

On the 29th of September 1989, the Ohio Environmental Protection Agency (OEPA) approved a closure plan for the HWSA in compliance with Ohio Administrative Code (OAC) Rules 3745-66-11 and 3745-66-12. The Plan assumed that clean closure could be accomplished by removal of a volume of contaminated soil. The Plan included a description of the pre-closure sampling which is the subject of this report and stated that the Plan would be revised to reflect the data collected.


FILL STAND
DRUM WASH PAD
BUILDING 560
ABANDONED FUEL LINE
BUILDING FOUNDATION
ABANDONED GASOLINE LINE
ABANDONED PIT
ABANDONED PIT
ROAD
25,000 GAL. TANK (RECYCLABLE JP-4)
25,000 GAL. TANK (DE ICING FLUID)
25,000 GAL. T (RECYCLABLE O
GROU DIR
SU-1
SU-2
SU-3
SU-4
SU-5
SU-6
SU-7
SU-8
SU-9
SU-10
SU-11
SU-12
SU-13
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HB-4
HB-5
HB-6
MW-1
MW-3

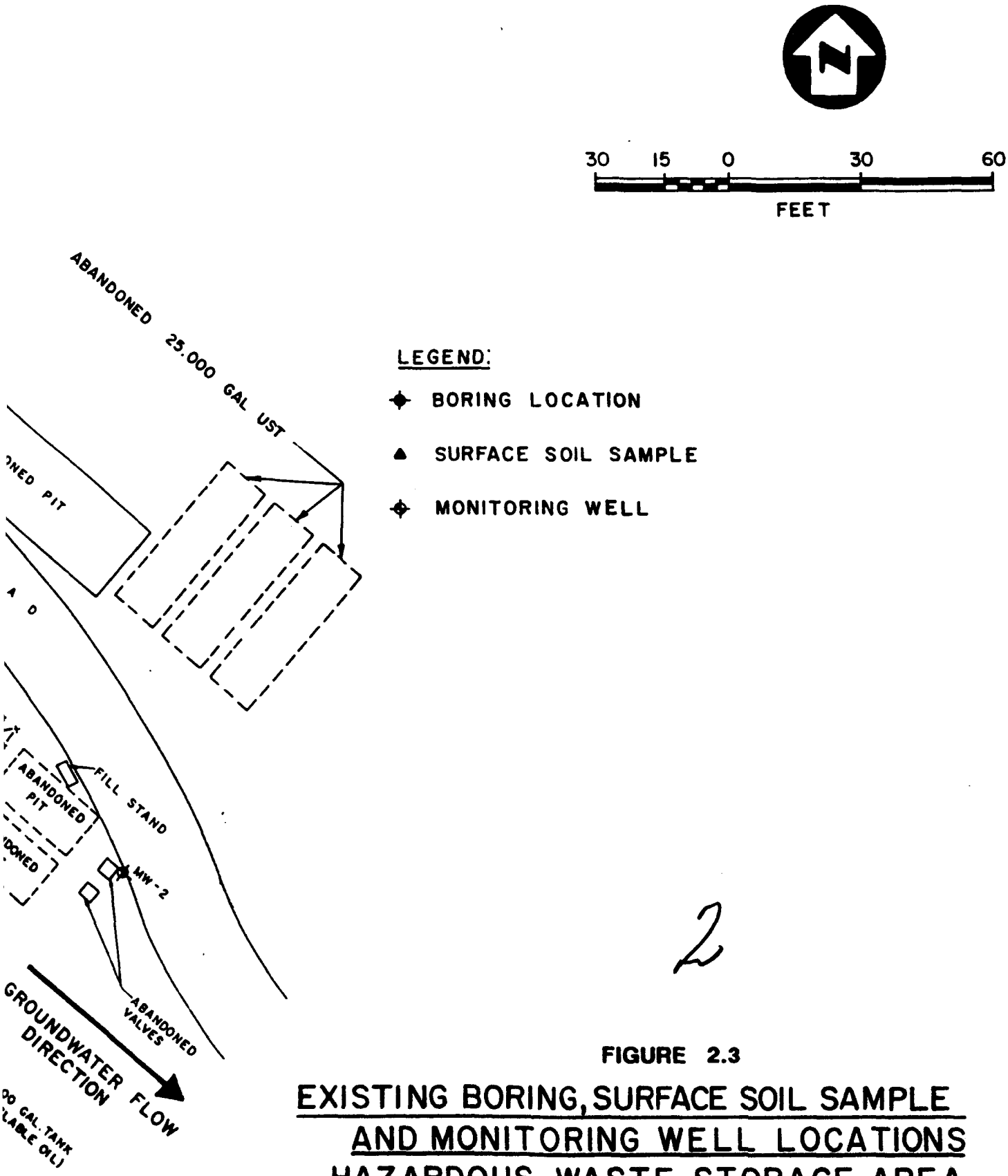

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FIGURE 2.3

EXISTING BORING, SURFACE SOIL SAMPLE AND MONITORING WELL LOCATIONS HAZARDOUS WASTE STORAGE AREA RICKENBACKER ANGB, OHIO

SECTION 3.0

PURPOSE AND SCOPE

The purpose of the additional investigation at the HWSA was to determine the extent of contamination to allow revision of the Closure Plan to affect a "clean" closure of the site. That is to remove contaminants to levels which would allow unrestricted use of the property without continued monitoring. This objective was accomplished through the following investigation techniques:

- Soil samples were collected from the surface and during drilling operations. Laboratory analyses of these soil samples determined the extent of contaminants in the soil.

- Monitoring wells were installed to test for the presence or absence of phase-separated hydrocarbons, to determine the hydrologic gradient and to collect groundwater samples for laboratory analysis.

- Aquifer tests (rising-head tests) were conducted on representative wells to determine the aquifer hydraulic conductivity.

SECTION 4.0

ENVIRONMENTAL SETTING

The environmental setting of the Base is described in this section with an emphasis on the identification of natural features that may influence the movement of hazardous waste contaminants.

4.1 CLIMATE

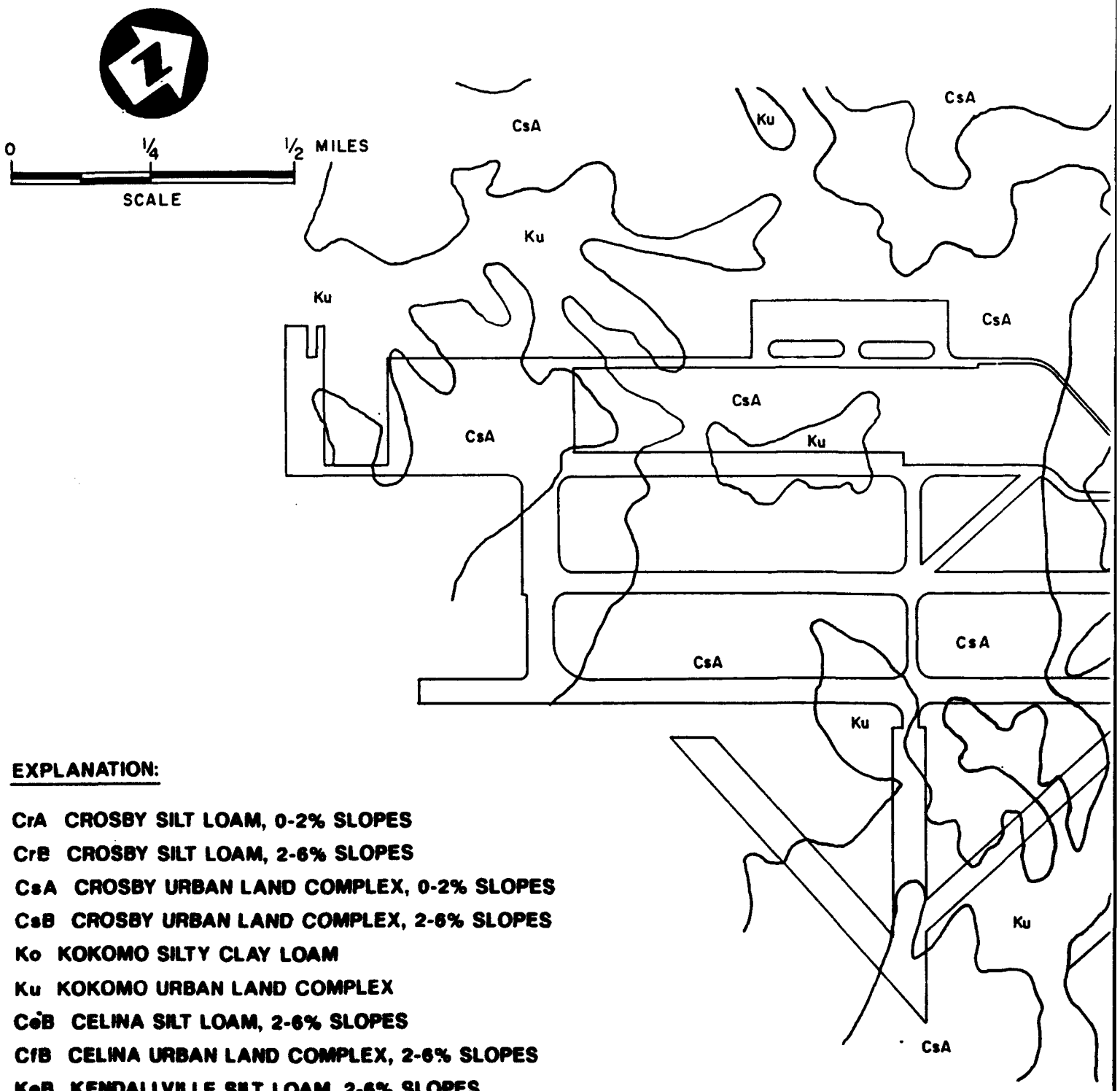
The climate of Columbus, Ohio is characterized as continental (Pierce, 1959). The mean annual temperature is 52°F. The coldest month is January, while the warmest month is July, with mean temperatures of 30°F and 74°F, respectively. Mean annual precipitation is 38 inches with October being the driest and June the wettest months. Net precipitation is calculated to be 2.71 inches per year (HMTC, 1987).

4.2 SOILS

Soils mapped at the Base are of the Kokomo and Crosby Series (Figure 4.1) (Soil Conservation Service [SCS], 1976). The soils are characterized as deep, very poorly drained, slowly to moderately slowly permeable soils formed in glacial tills on uplands. The Crosby series soils are formed on slopes up to 6 percent grade while the Kokomo series soils form on gentler 0-2 percent slopes on the higher landscape positions. The Crosby soils exhibit permeabilities of 0.06 to 0.6 in/hr in unleached horizons. The Kokomo soils have permeabilities of 0.2 to 2.0 in/hr.

4.3 SURFACE WATER HYDROLOGY

Rickenbacker ANGB occupies the drainage divide between Big Walnut Creek and Walnut Creek. Surface drainage from the Base is through an extensive storm drain network which includes corrugated metal and concrete drainage pipes and open drainage ditches. Surface water is routed through oil-water separators before release into surrounding surface streams.



EXPLANATION:

CrA CROSBY SILT LOAM, 0-2% SLOPES
CrB CROSBY SILT LOAM, 2-6% SLOPES
CsA CROSBY URBAN LAND COMPLEX, 0-2% SLOPES
CsB CROSBY URBAN LAND COMPLEX, 2-6% SLOPES
Ko KOKOMO SILTY CLAY LOAM
Ku KOKOMO URBAN LAND COMPLEX
CeB CELINA SILT LOAM, 2-6% SLOPES
CfB CELINA URBAN LAND COMPLEX, 2-6% SLOPES
KeB KENDALLVILLE SILT LOAM, 2-6% SLOPES
KeC2 KENDALLVILLE SILT LOAM, 6-12% SLOPES

SOURCE:
SOIL SURVEY OF FRANKLIN COUNTY,
USDA/SCS (1977)

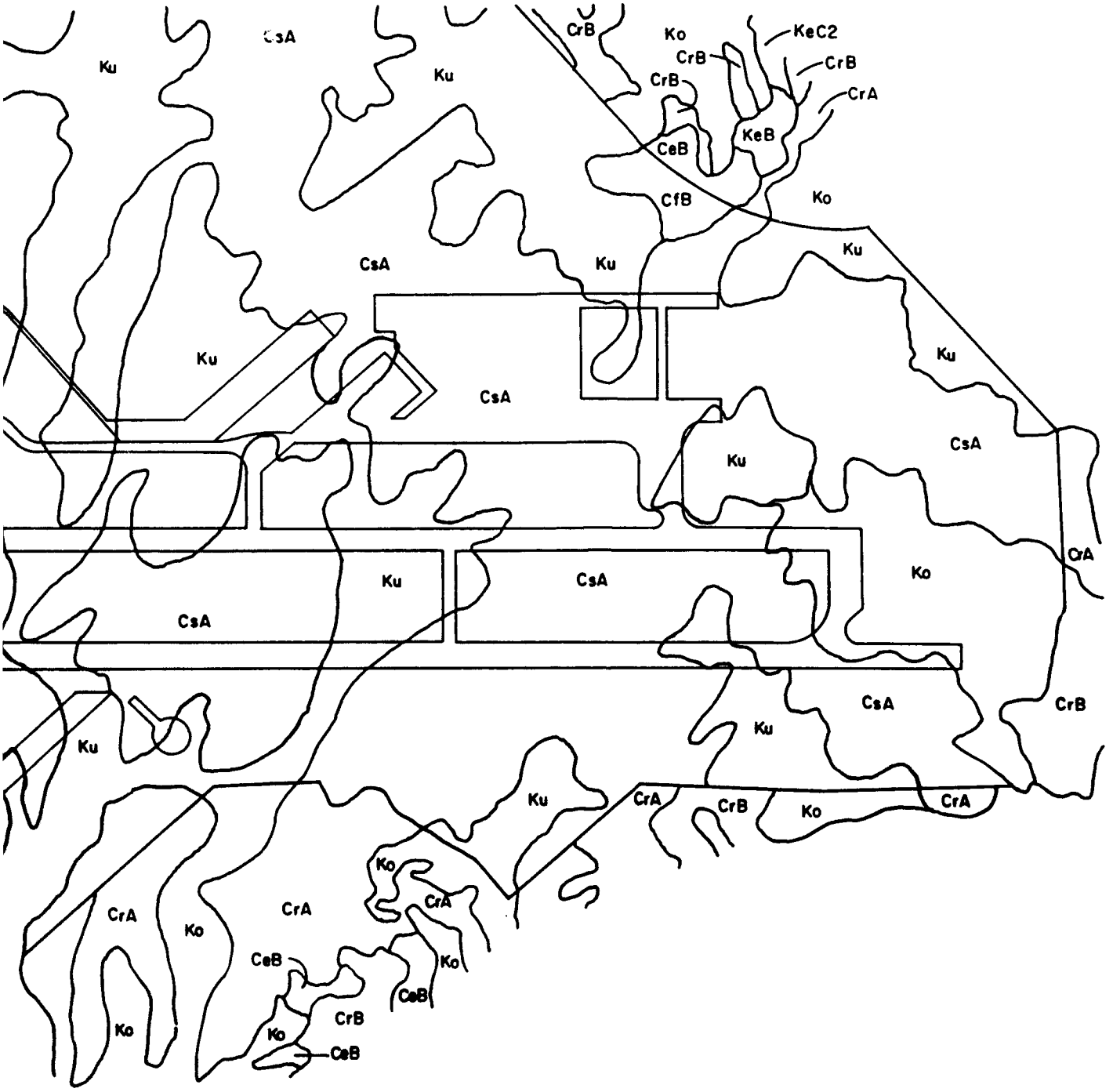


FIGURE 4.1

SOIL MAP
RICKENBACKER
AIR NATIONAL GUARD BASE

4.4 REGIONAL GEOLOGY

The Base is located in the Glaciated Central Lowlands Province just west of the Appalachian Plateau Province. The geology of the area is characterized by 200 feet(+) of Pleistocene glacial outwash sand and gravel and silty and clayey till filling a preglacial bedrock valley (Smith and Goldthwaite, 1958). The bedrock types under the mixed drift fill are Devonian limestones and shales of the Columbus and Delaware Formations.

4.5 LOCAL HYDROGEOLOGY AND GROUNDWATER USE

Groundwater is the primary source of drinking water for the Base and the Village of Lockbourne. The Base is underlain by two aquifers. The shallow aquifer has depths to static water levels of 3 to 20 feet and on base of the aquifer between 30 and 35 feet. The deep aquifer has static water levels between 50 and 60 feet and base of the aquifer between 200 and 210 feet at bedrock (ES April 1989). There are six water wells located on the Base. Five of these wells are located in the northwest portion of the Base, and supply drinking water for ANGB personnel and former Base housing residents and to the Village of Lockbourne (since June 1989). Of these five wells, well #2 is no longer in service. According to driller's logs, the five Base water-supply wells are completed in the coarse-sand and gravel of the deep aquifer directly on top of the bedrock at depths of 180 to 200 feet. Water from these five wells is treated by sand filtration and chlorination before distribution. Recent testing of water from the wells for priority pollutants indicated no contamination. The sixth water well is located at the Base Heating Plant. The well is screened at a depth of 85-100 feet beneath the surface, but is no longer in service.

The well supplying water to the golf course club house southeast of the Base is completed in sand and gravel at 63 to 73 feet. The well was formerly owned by the Base, but is now owned by the owners of the Country Club.

Homes in Lockbourne and along the rural roads surrounding the Base were formerly served by individual domestic water wells. These wells are completed in sand and gravel of the shallow and deep aquifers between 20 and 100 feet deep. Concern for water quality in Lockbourne increased following a study which indicated a higher than expected cancer rate and discovery of chlorinated methane compound contamination in

some wells (Ecology and Environment, 1986). Consequently, in June of 1989, the Village tied into the Base water system.

The shallow geology beneath the Base is composed of 10-20 feet of silt and clay at the surface, underlain by intermittent stringers and lenses of sand and gravel ranging in thickness from 1-10 feet. The direction of groundwater flow in the shallow aquifer is affected by both the Big Walnut Creek to the west and the Walnut Creek to the east. The Base is within a recharge area of the shallow aquifer with groundwater flow to the west, south or east depending on location.

The geologic material separating the shallow and deep aquifers beneath the Base consists of 30 to 40 feet of silty clay. The deep aquifer consists of fine-to-medium sand and gravel underlain by shale at an approximate depth of 200-210 feet.

SECTION 5.0
FIELD INVESTIGATION PROGRAM

The pre-closure sampling activities included soil sampling at the surface and at depth and the installation of six new monitoring wells in and around the HWSA. The elements of the sampling plan are summarized below. Details of the field investigation techniques, sampling and analytic procedures are given in this section. Section 6 presents the findings for the described field investigation.

5.1 FIELD INVESTIGATION PROCEDURES

5.1.1 Decontamination

All split-spoon samples, sampling trowels, bailers and other sampling equipment were decontaminated between samples by washing with a Liquinox and tap water wash, a tap water rinse, distilled water rinse and finally a methanol rinse. Augers and drill pipes were cleaned between borings by steam cleaning with tap water. This cleaning took place at the designated decontamination area on the Base.

An equipment decontamination area was designated. The decontamination pad consisted of a concrete base with curbing covered with plastic. The base and curbing were designed so that all washwater and soils were contained on the pad and drained into a sump. Waste from the sump was pumped into drums for temporary storage until final disposition. All drums were labeled as to date of collection and contents. The decontamination pad was of sufficient size to contain the largest drill rig which was used at the site. Exact specifications of the pad was determined after coordinating with Base personnel about the location of the pad and decontamination activities. The decontamination pad was located in a fenced area just south to southeast of Building 910, the Base Civil Engineer's Office.

5.1.2 Surface Soil Sampling

The purpose of surface soil sampling was to determine the presence and extent of contamination in the upper soil horizons at the HWSA where surface spills from drums may have occurred.

Surface soil samples were collected from the upper six inches of soil using a stainless steel trowel. Thirty-one surface soil samples were collected at the site in a grid pattern with 35 feet between centers. Figure 5.1 shows the locations of the sample points. Surface soil samples were analyzed for base-neutral, semi-volatile organics and for priority pollutant metals. The 35 foot grid spacing was based on guidance in U.S. EPA Document SW846 for collection of statistically valid samples.

5.1.3 Drilling Program

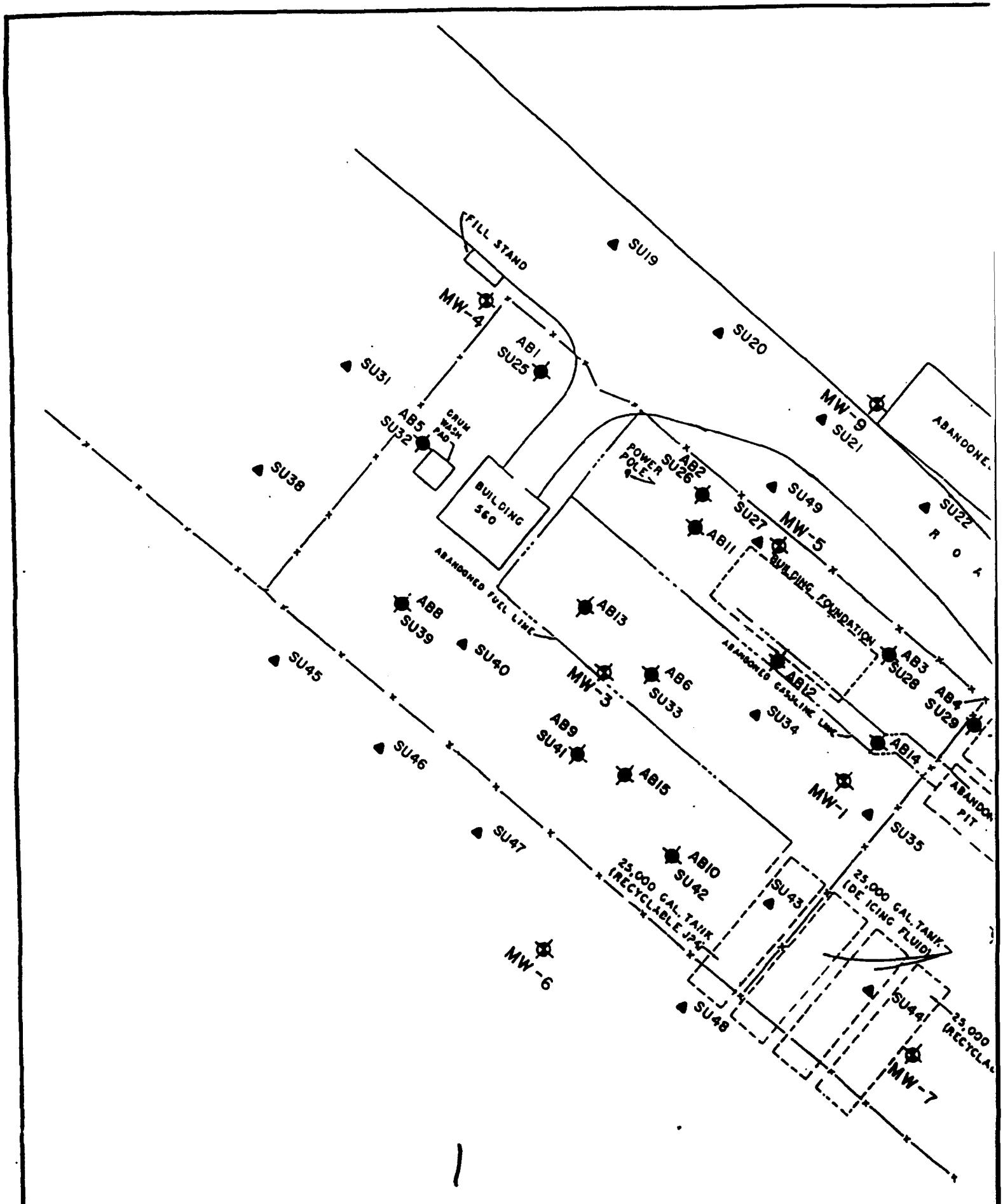
The objectives of the drilling program at the HWSA were to obtain samples for lithologic descriptions and stratigraphic correlation, to obtain samples of soil for chemical analysis, and to install groundwater monitoring wells. The monitoring wells were used for hydrogeologic characterization of the shallow aquifer beneath the HWSA and to obtain samples for evaluation of groundwater quality in the aquifer. Monitoring well drilling and construction were performed by an experienced driller. All drilling sites were screened with a metal detector to verify the location of underground pipelines and tanks before commencing drilling. In addition, appropriate Base personnel and site blueprints were used to further verify locations of underground pipelines and tanks.

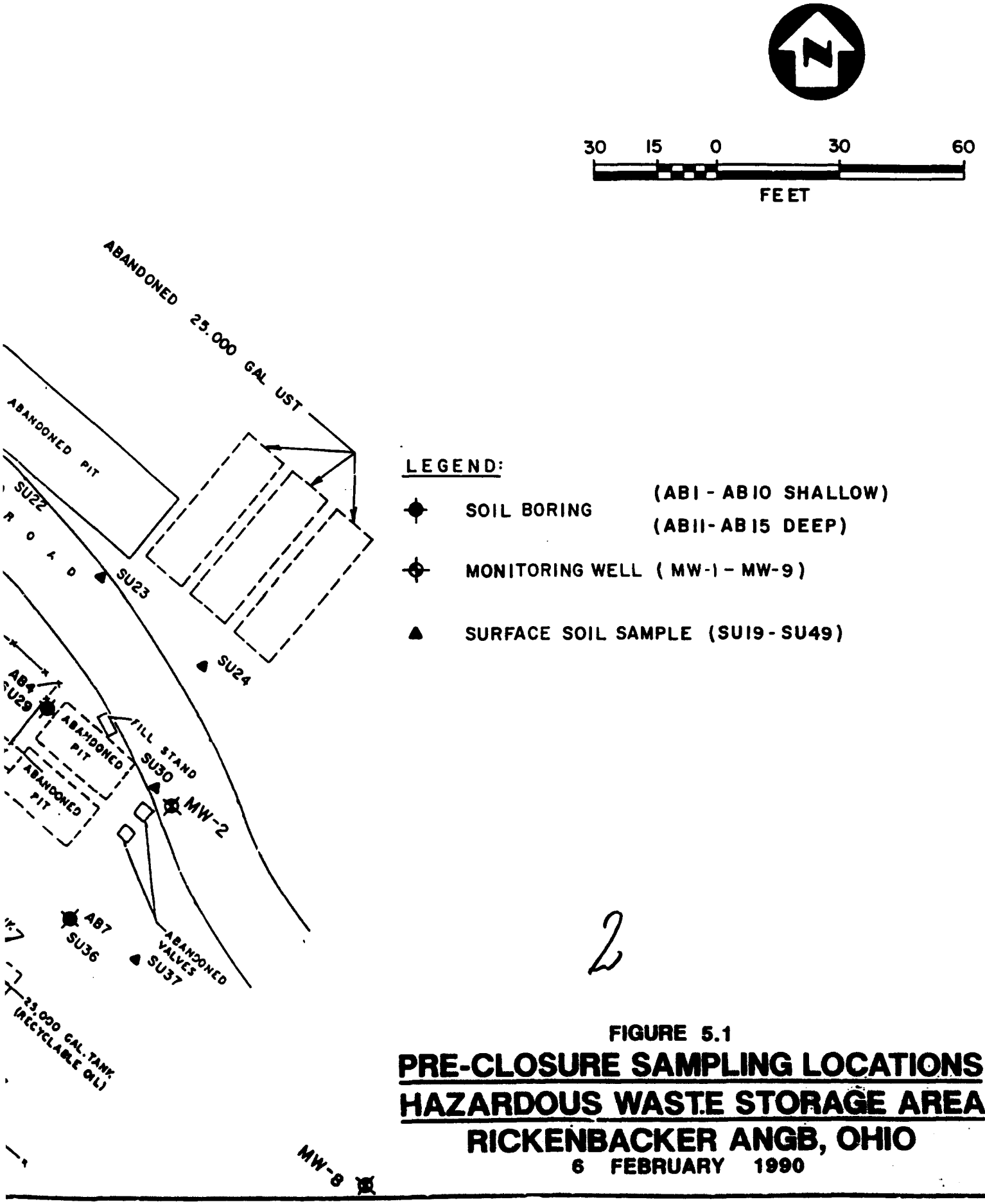
5.1.3.1 Drilling Procedures

Soil borings drilled for collection of soil samples and for installation of monitoring wells were advanced using 4.25 inch inside diameter (ID) continuous flight hollow-stem augers (approx. 6 inch diameter boring). A steel split-spoon sampler was used to collect samples, using American Society for Testing Materials (ASTM) Method D-1586. Borings not intended for monitoring wells were also made with a 4.25 inch ID hollow-stem auger. Following drilling, these borings were filled to grade with a cement/bentonite grout using a tremie pipe.

5.1.3.2 Shallow Borings

Ten of the surface soil sample sites were drilled to a depth of eight feet using a hollow-stem auger. Locations for shallow borings are shown on Figure 5.1 and Sheet 8. Soil samples were collected at depths of three and eight feet and analyzed for base-neutral, semi-volatile organics and priority pollutant metals. The purpose of the shallow borings was to determine the vertical extent of soil contamination. The 10 locations are


FILL STAND
SU19
MW-4
AB1
SU25
SU20
SU31
MW-9
SU21
ABANDONE
AB5
SU32
CRUM WASH PAD
SU38
BUILDING 560
POWER POLE
AB2
SU26
SU49
SU22
R O A
SU27
MW-5
AB11
BUILDING FOUNDATION
ABANDONED FUEL LINE
AB8
SU39
AB13
AB3
SU28
AB4
SU29
SU45
SU40
MW-3
AB6
SU33
ABANDONED GASOLINE LINE
AB12
SU34
AB9
SU41
AB14
SU46
AB15
MW-1
ABANDON PIT
SU35
SU47
AB10
SU42
25,000 GAL. TANK (RECYCLABLE JP4)
SU43
25,000 GAL. TANK (DE ICING FLUID)
MW-6
SU44
25,000 (RECYCLA
SU48
MW-7



2

FIGURE 5.1

PRE-CLOSURE SAMPLING LOCATIONS HAZARDOUS WASTE STORAGE AREA RICKENBACKER ANGB, OHIO

6 FEBRUARY 1990

in areas of greater contamination determined from the 1988 sampling results (ES, SI Report, 1990). The eight to ten foot sampling depth is the approximate depth to static water.

5.1.3.3 Deep Borings

Five borings in areas of greatest contamination were advanced to the base of the shallow aquifer in order to define the vertical extent of the soil contamination. Deep boring locations are shown on Figure 5.1. The locations were selected based on results of the 1988 sampling (ES, SI Report, 1990). Sampling in these borings was continuous. Borings were advanced until an apparently uncontaminated sample was obtained. The deepest (apparently uncontaminated) and apparently most contaminated samples were submitted to the laboratory to be analyzed for base-neutral, semi-volatile and volatile organics and priority pollutant metals.

5.1.4 Soil Boring Sampling

During drilling operations, soil samples were collected with a split-spoon sampler using the Standard Penetration Test (ASTM D-1586). Soils were classified with respect to type, by the visual-manual procedure (ASTM D-2488) noting mineralogy, color, odor, staining, etc. (see Appendix A). The samples were also checked for the presence of organic vapors. The test for vapors involved placing a portion of the sample, not intended for volatile analysis at the laboratory, in a jar, sealing the jar with aluminum foil, allowing the sample to equilibrate for at least ten minutes, then measuring the concentration of organics in the headspace of the jar using a meter with a photoionization detector (PID). The PID was calibrated with zero atmospheric air and a 100 ppm isobutylene standard. Both the PID and samples were allowed to stabilize at room temperature (70°F) before analysis. This step is taken because PID's are less accurate below 40°F and temperatures in the field during sampling were consistently below freezing.

Split-spoon samplers used to collect samples to be analyzed for volatile organic compounds were assembled with several 3 and 6-inch brass liners. The number of liners used was determined by the length of the split-spoon sampler. After driving, the sampler was disassembled and the second liner from the bottom (stratigraphically) was sealed with Teflon-lined caps, wrapped in aluminum foil and securely taped. Samples

thus sealed were transported to the laboratory. Liners remaining in the sampler were extruded and the material was used for lithologic description and other analyses. Emptied liners were decontaminated and reused in subsequent samples.

Selected soil samples from drilling, and all surface soil samples were packaged and shipped to the ES Berkeley Laboratory for chemical analysis. Soil samples selected for chemical analysis for non-volatile constituents were removed from the sampler and placed in an appropriate sample bottle. The sample bottle types that were used for soil samples are presented in Table 5.1.

5.1.5 Monitoring Well Construction, Completion and Development

Six additional soil borings were made into the shallow aquifer for installation of monitoring wells. The locations of six monitoring wells are shown on Figure 5.1.

The wells consisted of 2-inch ID Schedule 40 polyvinyl chloride (PVC) casing and screen. The casing and screen have threaded, flush joints and a threaded bottom cap. A ten-foot screen, machine slotted with 0.010 inch openings was set spanning the water table to detect floating contaminants and to allow for seasonal water table fluctuations. The screen and casing were installed through the inside of the augers. A sand pack consisting of No. 20x40 bagged silica sand was poured around the screen while the augers were slowly withdrawn to prevent bridging of the sand. The sand pack and screen slot dimensions were selected based on the grain size of the aquifer and surrounding materials. The sand pack extended two feet above the screen. A minimum two-foot thick bentonite pellet seal was placed above the sand pack. A cement/bentonite grout mixture (5% bentonite) was placed from the top of the bentonite seal to six inches below the ground surface. A typical monitoring well construction diagram for wells to be installed in the shallow aquifer is presented in Figure 5.2. The construction of each monitoring well was recorded on a HAZWRAP (Hazardous Waste Remedial Actions Program) monitoring well construction log (Figure 5.3).

The wells were completed with two to three feet of casing extending above the ground surface. A protective steel casing (six feet long) equipped with a locking cap was set into the cement grout to a depth below the frost line and a minimum 6 inch thick by two feet square concrete pad was installed around the riser pipe of the above-grade

TABLE 5.1

RICKENBACKER ANGB, COLUMBUS, OHIO
ANALYTICAL METHODS AND COLLECTION SPECIFICATIONS
FOR SOIL SAMPLES

Parameter	Analytical Method (1)	Sample Container	Preservation Method	Holding Time
Volatile Organics	CLP/8240[2]	Brass split-spoon sampler sealed w/Teflon(R) or 8 oz., widemouth glass w/Teflon(R) liner	Cool, 4°C	10 days after receipt
Semi-Volatile Organics	CLP/8240[2]	8 oz, widemouth glass w/Teflon(R) liner	Cool, 4°C	Samples must be extracted within 5 days days of receipt and extracts analyzed within 40 days
Metals:[3]				
Antimony	6010			
Arsenic	7060			
Beryllium	6010			
Cadmium	6010			
Chromium	6010			
Copper	6010			
Lead	6010	8 oz, widemouth glass w/Teflon(R) liner	Cool, 4°C	6 months (except Mercury; 28 days)
Mercury	7470			
Nickel	6010			
Selenium	7841			
Silver	6010			
Thallium	7840			
Zinc	6010			

1. Source unless otherwise noted: SW 846, Test Methods for Evaluating Solid Wastes, U.S. EPA, November 1986.

2. 8240 and 8270 methods were used during 1988 investigations.

3. All samples for metals analysis were prepared by Method 3050.

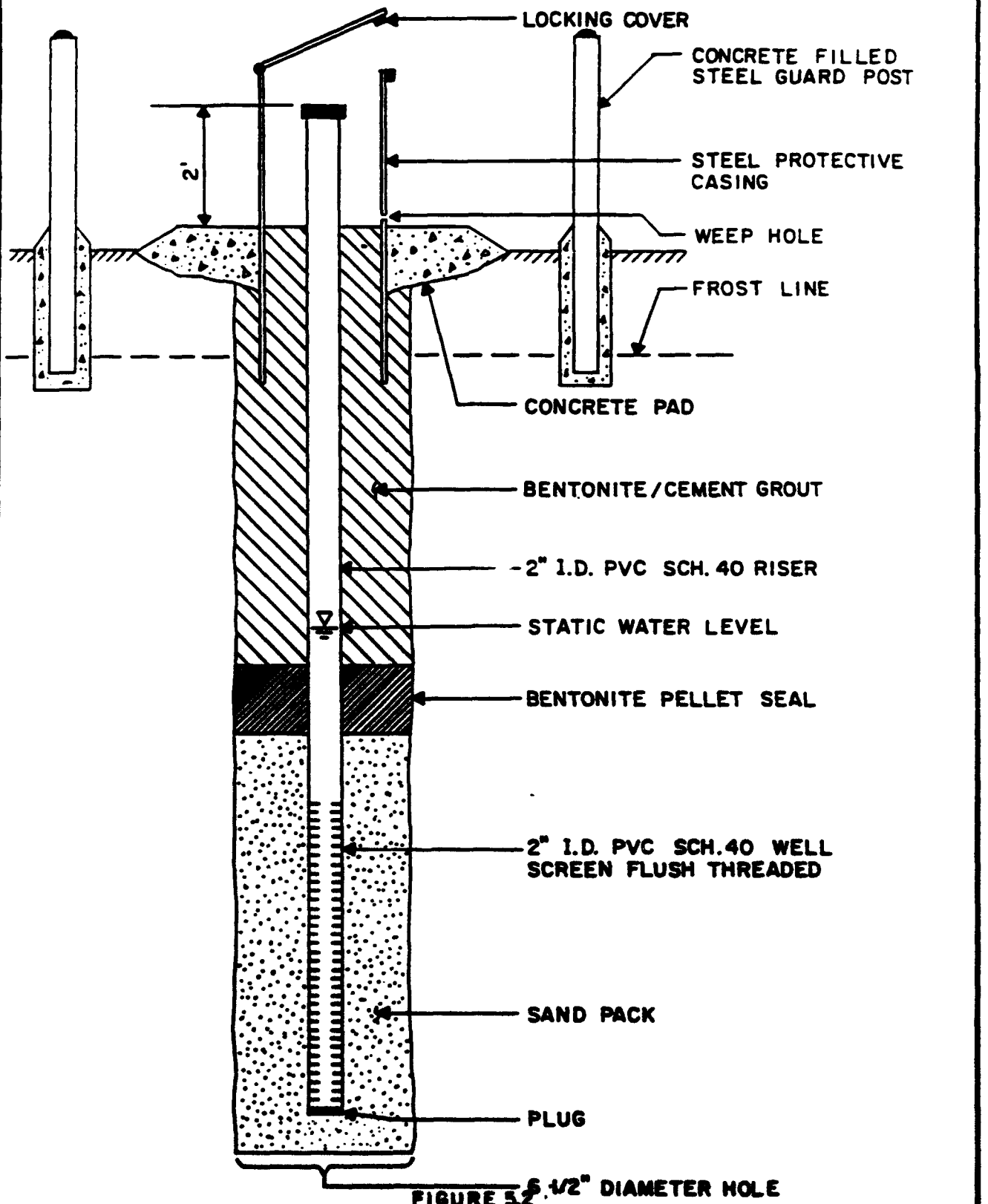


FIGURE 5.2

TYPICAL

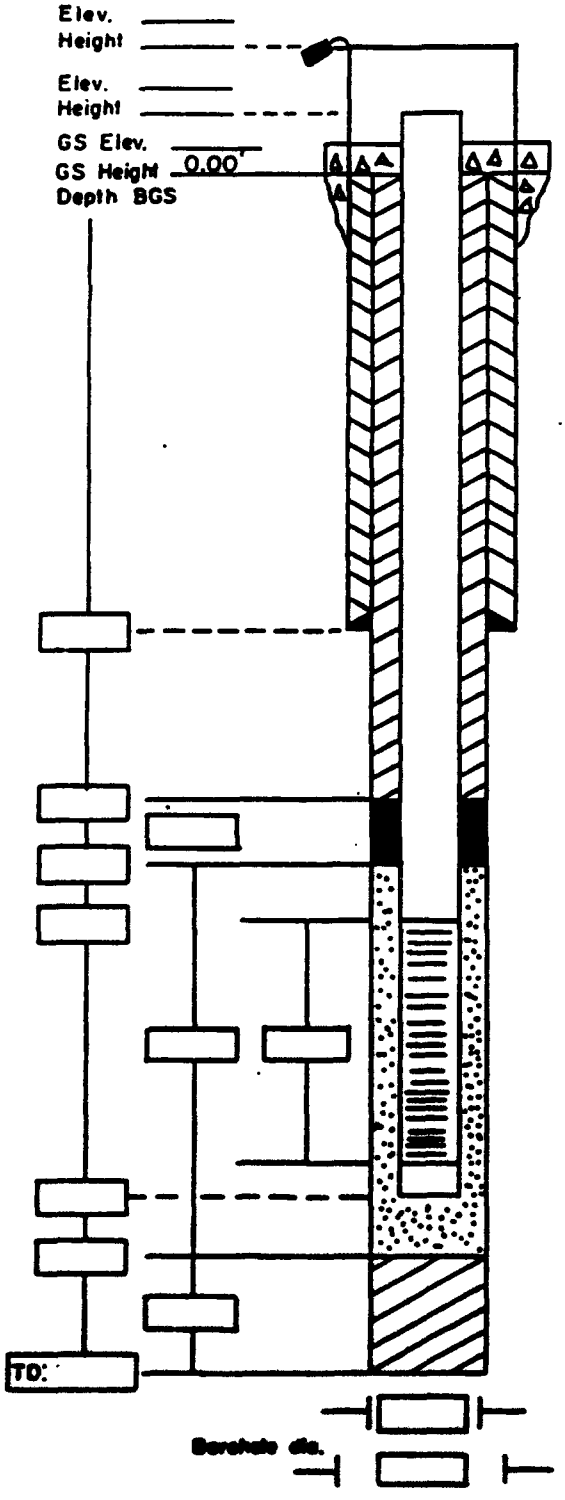
MONITORING WELL CONSTRUCTION

FOR SHALLOW AQUIFER WELLS

REV. DATE: JAN 1989

MONITORING WELL CONSTRUCTION LOG - Double Cased

WELL NO.:	Installation:	Site
Project No.:	Client/Project:	
HAZWRAP Contractor:	Drlg Contractor:	
Comp. Start: (: m)	Comp. End: (: m)	
Built By:	Well Coord:	



PROTECTIVE CSG
Material/Type
Diameter
Depth BGS Weep Hole (Y/N)

GUARD POSTS (Y/N)
No. Type

SURFACE PAD
Composition & Size

SURFACE CSG
Type
Diameter Total Length

GROUT: Setup/Hydration Time
Composition & Proportions

Interval BGS
Tremied (Y/N)

RISER PIPE
Type
Diameter
Total Length(TOC to TOS)

GROUT
Composition & Proportions

Interval BGS
Tremied (Y/N)

CENTRALIZERS (Y/N)
Depth(s)

SEAL
Type
Source
Setup/Hydration Time Vol. Fluid Added
Tremied (Y/N)

FILTER PACK
Type
Amount Used
Source
Gr. Size Dist.
Tremied (Y/N)

SCREEN
Type
Diameter
Slot Size & Type

SUMP (Y/N)
Interval BGS Length
Bottom Cap (Y/N)

BACKFILL PLUG
Material
Setup/Hydration Time
Tremied (Y/N)

FIGURE 5.3

wells. The well number was imprinted on the well cover lid. Three steel guard posts were erected around each of the protective steel casings, each set two and one-half feet deep in separate footings. Monitoring wells 4 through 8 were developed by pumping while monitoring well 9 was hand-bailed until the pH and conductivity stabilized to ± 10 percent. Water level recovery was monitored after final well development to complement slug test results.

5.1.6 Field Measurements

Field measurements of temperature, pH and specific conductance were performed on water samples at the time of sample collection.

5.1.6.1 Temperature and pH Measurement

The temperature and pH of each water sample was measured using an electronic pH probe. The probe was calibrated using buffer solutions of the appropriate range for expected values of pH to be found at the Base. The meter was also be re-calibrated according to manufacturer's instructions.

5.1.6.2 Conductivity Measurement

The specific conductance of each water sample was measured with a portable conductivity meter. A standard potassium chloride solution was used to calibrate the instrument prior to use. The meter was also re-calibrated periodically according to manufacturer's instructions.

5.1.7 Groundwater Sampling

Prior to sampling each monitoring well, the static water level was measured, and pH temperature and conductivity of the water were determined. The well was purged by bailing until two to three total well water volumes (TWWV) were removed and pH, conductivity and temperature stabilized ($\pm 10\%$) or the well was dry. The TWWV includes water in the screen, riser and sand pack. The TWWV was calculated for each well after measuring static water level and was recorded in the field log book. Plastic ground covering was used at each well site to prevent contamination of down-well sampling devices from surface soils.

The bailers used for purging were constructed of Teflon(R). Samples were collected using a Teflon(R) Bailer with dedicated polypropylene line. The first sample withdrawn was put in a container for volatile analysis. Other sample bottles were filled with the remaining water. The 1990 investigation utilized pre-preserved sampled bottles supplied by the laboratory. Appropriate preservatives were added to the sample bottles after sample collection during the 1988 investigation. One sample from each well collected for metals analysis was filtered in the field prior to preservation with a 0.45 micron mesh filter to remove suspended particles from the water. Filtered samples were analyzed for the concentrations of metal dissolved in the water. Both filtered and unfiltered samples from each well were analyzed for metals concentration. Vials used for containing samples to be analyzed for volatile organics were checked to assure that no air bubbles were present before the samples were packaged for shipment. A summary of the types of sample bottles and preservatives used for water samples is presented in Table 5.2.

The bailers and tip of the water level indicator and interface probe used at each well were decontaminated before use at the next sampling location. The probe of the pH wand and the conductivity meter were rinsed with deionized, organic free water after each use.

5.1.8 Sampling Program

5.1.8.1 Sample Numbering System

Each sample was assigned a unique sample identification number that describes where the sample was collected. Each number consisted of a group of letters and numbers, separated by hyphens. The sample numbering system is presented in Table 5.3.

TABLE 5.2

RICKENBACKER ANGB, COLUMBUS, OHIO

ANALYTICAL METHODS AND COLLECTION SPECIFICATIONS FOR WATER SAMPLES

Parameter	Analytical Method (1)	Sample Container	Preservation Method	Holding Time
Volatile Organics	CLP/8240[2]	40 ml, glass, Teflon(R)-lined septum cap	HCL (4 drops), Cool, 4°C	10 days after receipt
Semi-Volatile Organics	CLP/8240[2]	1 Liter, amber glass, w/Teflon(R) liner	Cool, 4°C	Samples must be extracted within 5 days of receipt and extracts analyzed within 40 days
Total Metals:[3]				
Antimony	6010			
Arsenic	7060			
Beryllium	6010			
Cadmium	6010			
Chromium	6010			
Copper	6010			
Lead	6010	2 liter plastic or glass	HNO_3[3] to pH<2	6 months (except Mercury: 28 days)
Mercury	7470			
Nickel	6010			
Selenium	7740			
Silver	6010			
Thallium	7841			
Zinc	6010			

1. Source unless otherwise noted: SW 846, Test Methods for Evaluating Solid Wastes, U.S. EPA, November 1986.

2. 8240 and 8270 methods were used during 1988 investigations.

3. All samples for metals analysis were prepared by Method 3050.

TABLE 5.3

SAMPLE NUMBERING SYSTEM
RICKENBACKER ANGB, COLUMBUS, OHIO

Project Identification:	RB for Rickenbacker
Site Identification:	HW for Hazardous Waste Storage Area
Sample Source Number (sequential):	
MW _____	Monitor Well #
HB _____	Hand Boring #
AB _____	Auger Boring #
SU _____	Surface Sediment Sampling Location #
Sample Number:	
GW _____	Ground Water
SS _____	Soil Sample (Split-Spoon or HB)
GS _____	Surface Soil Grab Sample

Example:

RB-HW-MW6-SS1

First soil sample from Monitor Well #6 drilled at the Hazardous Waste Storage Area at Rickenbacker ANGB.

5.1.8.2 Sample Labels

All physical samples obtained at the site were placed in an appropriate sample container for shipment to the laboratory. Each sample bottle was identified with a separate identification label. The information on the label included the following information:

- Project identification;
- Sample identification;
- Preservatives added;
- Date of collection; and
- Required analytical method numbers.

5.1.8.3 Chain-of-Custody Records

All samples were accompanied by a Chain-of-Custody Record (Figure 5.4). A Chain-of-Custody Record accompanied the sample from sample collection and shipment to the laboratory and through the laboratory.

The "Remarks" column was used to record specific considerations associated with sample acquisition such as: sample type, container type, sample preservation methods, values for organic headspace concentrations for specific samples, and method number of analyses to be performed.

One copy of this record followed the samples to the laboratory. The laboratory maintains one file copy, and the completed original was returned to the project manager as a part of the final analytical report to document sample custody transfers. Shipments were sent by air express courier.

5.1.8.4 Sample Handling, Packaging and Shipment

Precleaned sample bottles were supplied by the laboratory. These bottles were cleaned with a laboratory grade detergent wash and rinse, an acid rinse, a multiple deionized water rinses and final oven drying, capping and packing under quality controlled conditions. The bottles were stored in their original unopened packages until used at the collection site, with the exception of the bottles used for trip blanks. These bottles were filled with organic-free water at the laboratory where the analyses were performed and resealed prior to shipment to the field.

CHAIN OF CUSTODY FORM

ENGINEERING-SCIENCE

10101 VILLAVIEW ROAD, SUITE 301, CLEVELAND, OHIO 44119 • 216/481-9606

CHAIN OF CUSTODY RECORD

PROJ. NO. | PROJECT NAME/LOCATION

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETER	REMARKS

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment, Copy returned with Report.

FIGURE 5.4

Individual sample bottles were wrapped in packing material to prevent breakage in shipment to the laboratory. The packages were be placed in insulated shipping coolers with plastic bags of ice.

A Chain-of-Custody Record describing the contents of the cooler was placed in a sealed plastic bag and taped to the upper inside lid of the cooler. The shipping container was taped shut with security labels taped over opposite ends of the lid. The container was then shipped for overnight delivery to the laboratory.

5.1.8.5 Field Log Books

Bound field log books were maintained by the field team leader and team members. Information pertinent to the field survey and/or sampling was recorded in the log books. These are bound books, with consecutively numbered pages. Waterproof ink was used in making all entries. Entries in the log book included at least the following:

- Name and title of author, date and time of entry, and physical/ environmental conditions during field activity;
- Purpose of sampling activity;
- Name and address of field contact;
- Name and title of field crew;
- Name and title of any site visitors;
- Type of sampled media (e.g., soil, sediment, groundwater, etc.);
- Sample collection method;
- Number and volume of sample(s) taken;
- Description of sampling point(s);
- Date and time of collection;
- Sample identification number(s);
- Sample distribution (e.g., laboratory);
- References for all maps and photographs of the sampling site(s);
- Field observations;
- Any field measurements made, such as pH, temperature, water level, etc.; and
- Weather conditions.

When an error was made in a log book, the person who made the entry made the correction simply by crossing a line through the error and entering the correct

information. The erroneous information was not be obliterated. All entries were signed and dated and all corrections initialed and dated.

5.1.9 Analytical Methods

The samples of soil and groundwater were analyzed for the parameters listed in Tables 5.1 and 5.2. The target compounds for methods using gas chromatography/mass spectrometry (GC/MS) are listed in Table 5.4.

5.1.9.1 Detection Limits

The detection limits for organic compounds determined by CLP GC/MS methods are published in the respective methods. These method detection limits (MDL) are determined using laboratory prepared standard solutions. The actual detection limit obtainable for an environmental sample may be higher due to the sample matrix. The practical quantitation limits published in the methods are used as a guideline for establishment of the lower limit for quantitation.

The minimum detection limits for the requested metals analyses are published for the respective methods. The minimum reporting limits for these metals are shown in Table 5.5.

5.1.10 Quality Assurance Samples

Quality Assurance (QA) samples were submitted to the laboratory with the groundwater and soil. Blind duplicate samples were given a false sample number similar to the true sample identity. The true sample numbers were recorded in field records, but did not appear on the sample bottle labels or the Chain-of-Custody Records. The purpose of the duplicate samples is to provide a check of analytical repeatability. The frequency of the duplicate samples was one for each ten soil samples and one for each ten groundwater samples submitted for each analysis. Duplicate samples were collected for analysis at areas where contamination was suspected based on odor, discoloration, the presence of organic vapors or anomalous pH or conductivity measurements. A total of eight duplicate samples were taken. Seven duplicates of soil samples, and one duplicate of a water sample.

TABLE 5.4

LIST OF COMPOUNDS FOR GC/MS METHODS - RICKENBACKER ANGB, COLUMBUS, OH

Base/Neutral Extractable Semi-Volatile Organics

Acenaphthene
Acenaphthylene
Anthracene

Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Benzo(a)anthracene
Benzo(ghi)perylene
Benyl Alcohol *
Bis(2-chloroethyl)ether
Bis(2-chloroethoxy)methane
Bis(2-ethylhexyl)phthalate
Bis(2-chloroisopropyl)ether
4-Bromophenyl phenyl ether
Butylbenzlphthalate

2-Chloronaphthalene
4-Chloroaniline
4-Chlorophenyl phenyl ether
Chrysene

Dibenzo(a,h)anthracene
Dibenzofuran
Di-n-octylphthalate
1,3-Dichlorobenzene
1,2-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
Diethyl phthalate
Dimethyl phthalate
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octylphthalate

Fluoranthene
Fluorene

Hexachlorobenzene
Hexachlorobutadiene
Hexachloroethane
Hexachlorocyclopentadiene

Indeno(1,2,3-cd)pyrene
Isophorone

Naphthalene
Nitrobenzene
N-Nitrosodiphenylamine
2-Nitroaniline
3-Nitroaniline
4-Nitroaniline
N-Nitroso-Dimethylamine *
N-Nitroso-di-n-dipropylamine

2-Methylnaphthalene

Phenanthrene
Pyrene

1,2,4-Trichlorobenzene

* These compounds are not on the Target Compound List (TCL) but were included in the analysis report.

TABLE 5.4 (continued)

LIST OF COMPOUNDS FOR GC/MS METHODS - RICKENBACKER ANGB, COLUMBUS, OH

Volatile Organics

Acrolein *
Acetone
Acrylonitrile *

Benzene
Bromomethane
Bromodichloromethane
Bromoform
2-Butanone

Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
2-Chloroethyl vinyl ether *
Chloromethane
Dibromochloromethane
1,2-Dichloropropane
1,3-Dichlorobenzene *
Methylene Chloride
cis-1,3-Dichloropropene
4-Methyl-2-pentanone
1,2-Dichlorobenzene *
1,4-Dichlorobenzene *
1,1-Dichloroethene
1,1-Dichloroethane
1,2-Dichloroethane
trans-1,2-Dichloroethene

trans-1,3-Dichloropropene

2-Hexanone
Ethyl Benzene
Styrene

1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane *

Vinyl chloride
Vinyl Acetate *

Xylenes

* These compounds are not on the Target Compound List (TCL) but were included in the analysis report.

Additional QA samples consisted of: one field blank (water in appropriately preserved sample bottles) from each sampling period and water source, one equipment wash blank (deionized organic free water poured through the decontaminated sampling equipment into the appropriately preserved sample bottles) for every other day of sampling, and one trip blank (VOA vials filled by the laboratory with deionized, organic free water) in each cooler transporting samples for volatile organic analyses. The purpose of the trip blank is to monitor for sample contamination that might occur during shipping and handling or from improperly cleaned sample bottles. The purpose of the field blank is to verify the quality of the water used for decontamination. The purpose of the equipment wash blanks is to test the effectiveness of decontamination procedures. The discussion of blank and duplicate analysis is included in the data validation report (Appendix D).

5.1.11 Aquifer Testing

Rising-head aquifer tests were performed on monitoring wells 4, 6, 7 and 8 in order to estimate aquifer characteristics (see Appendix C). The tests followed protocol for field determination of hydraulic conductivity set out in EPA Method 9100.

For this test, a transducer is placed at the bottom of the well, this sends a signal to a remote In-Situ Inc. Hermit Data Logger which records the amount of water above the transducer. A known amount of water (slug) is withdrawn from the well, and the Hermit records the change in water level in the well versus time.

The data collected during the slug tests were used to calculate hydraulic conductivity values according to the technique developed by Hvorslev (1951). These values are used to estimate transmissivity and water flow velocity through the tested aquifer.

5.1.12 Contaminated Materials Management

All development water, purge water, pump test discharge water and decontamination wastewater was collected and stored on-site pending receipt of results of chemical analysis of representative samples. Excess soil cuttings from the drilling operation were placed on and covered with plastic sheeting until results of chemical analysis were received. The source and date of collection of the waste material in each container was clearly marked on the outside of the container. Soil and groundwater

TABLE 5.5

MINIMUM REPORTING LIMITS

METAL	ANALYSIS METHODS	WATER ug/L	SOIL mg/Kg
Antimony	6010	100	10
Arsenic	7060	10	1
Beryllium	6010	5	0.5
Cadmium	6010	10	1
Chromium	6010	50	5
Copper	6010	25	2.5
Lead	6010	20	10
Mercury	7470	0.2	20
Nickel	6010	40	4
Selenium	7740	10	1
Silver	6010	50	5
Thallium	7841	100	10
Zinc	6010	20	2

analyses for samples collected from the wells from which the contaminated material came were used to establish chemical properties of the waste and determine disposal needs.

5.1.13 Site Surveys

All surface soil, soil boring and monitoring well locations were identified on maps provided by Base personnel. The horizontal locations of the soil borings and monitoring wells were surveyed by a licensed surveyor to an accuracy of one foot. The vertical location of a clearly marked measuring point on the top of each monitoring well was also surveyed with reference to U.S. Geological Survey or U.S. Geodetic Survey benchmarks with an accuracy of $\pm$0.01 foot. Accurately locating the surface soil sampling sites was accomplished by tape and compass orientation with respect to a local structure or roadway which appears on Base plans.

SECTION 6.0

FIELD INVESTIGATION FINDINGS

6.1 GEOLOGY

A total of twenty-one borings were drilled at the HWSA (see Figure 5.1) between 22 January and 9 February 1990. Ten borings were drilled to a depth of ten feet, five borings to a depth of 23 to 27 feet, and six borings were drilled to sixteen feet and completed as monitoring wells. As seen in the boring logs (Appendix A) and cross-sections (Figures 6.1 and 6.2, respectively), lithologies are typical of the glacial depositional environment as outlined in Section 4.

Soil from the ground surface down to eight feet is characterized by a medium brown silty clay, with trace amounts of pebbles. This layer grades into a grayish silty clay from eight to fourteen feet, with moisture encountered at ten feet. This layer is immediately underlain by the shallow aquifer, wet, fine to medium grained brown sandy gravel from fourteen to eighteen feet. The aquifer has some interbedded thin layers of fine, well-sorted brown sands and fine to medium-grained gray sandy gravel. Upon equilibration in the monitoring wells, the static water level was approximately ten feet below grade. The shallow aquifer is separated from a second aquifer by a confining layer of hard, dense gray clay from eighteen to nineteen feet below grade. Immediately below this confining layer exists a fine to medium grained gray sandy gravel interbedded with thin layers of fine grained well sorted brown sands and dense gray clays. This layer (shown in cross-section B-B', Figure 6.2) is underlain by a hard dense gray clay down to at least 27 feet. Whether these sand layers represent two distinct aquifers or become one continuous sand away from the HWSA is unknown at this time.

On-site field screening of the soil samples taken from these borings was done using a Photovac Microtip photoionization detector. Procedure for this field screening is outlined in Section 5. This instrument measures volatile organic contents from each soil sample collected in parts per million (ppm) concentration. The concentrations of volatile organics from these samples ranged from 10 to 3,180 ppm. Higher levels of volatiles coming from borings RB-HW-AB1 (1,666 ppm), RB-HW-AB11 (3,180 ppm), RB-HW-AB14 (2,260 ppm), RB-HW-MW5 (2,376 ppm), RB-HW-MW6 (1,304 ppm)

and RB-HW-MW7 (930 ppm). See boring logs, Appendix A for complete field screening results.

Visually, few of the soil samples collected from the soil borings appeared to be contaminated. Hydrocarbon staining and odors were present in RB-HW-AB3, RB-HW-AB4, RB-HW-AB12 and RB-HW-MW7. For a more detailed description of these soil samples, see the boring logs for both soil and monitoring well borings in Appendices A and B, respectively.

6.2 HYDROGEOLOGY

In addition to the three previously installed monitoring wells on site, an additional six groundwater monitoring wells were installed at the HWSA (see Figure 5.1). All wells were set at a depth of fifteen feet with total depth of the boring at sixteen feet. Monitoring well construction logs are shown in Appendix B.

Two factors influenced the depths at which the monitoring wells were completed. Based upon field observations from the split-spoon soil samples, well screens were placed at depths spanning the most porous/permeable area of the shallow aquifer. This being the sandy clays and gravels and fine to medium grained sand strata. Well construction details are summarized in Table 6.1.

Secondly, the monitoring well borings were terminated above the underlying hard, dense, gray clay acting as the confining layer between the shallow and second aquifers. The basal clay was at a depth of eighteen feet, total depth for monitoring wells was sixteen feet, giving a two-foot buffer of undisturbed sediments above the confining layer. In this way, any possible contamination above this layer would have no avenue to contaminate the water and sediments below the confining clay layer.

All groundwater monitoring wells present at the HWSA, including the three existing wells installed during the site investigation, had water samples collected from them. Water level measurements were recorded from each well, these levels were then placed on a site map and general water table surface maps were constructed (see Figure 6.3 and 6.4). As shown in the water table maps from February and June 1990, the apparent hydrologic gradient is in a southerly to south-easterly direction. The two maps differ locally in the vicinity of the four USTs located in the southern portion of the site. On the February water table map, water levels around the four USTs are elevated

compared to the nearest monitoring wells. This can be explained by the accumulation of water in the more permeable fill material surrounding these tanks. This however, is not apparent in the June 1990 water table map. Here, the four USTs are a low water level area compared to the surrounding area, with water levels being more similar from wells in the nearest vicinity to the tanks. In both water level maps (February and June 1990) MW6 represent the furthest downgradient monitoring well for the HWSA.

Development and purging of each well was completed as described in Section 5.1.5, then 5.1.7. Static water levels were reached after development and before purging of each well. With the exception of MW5, all wells were visually clean and clear of any phase-separated hydrocarbons (PSH). MW5, however, contained a four foot thick layer of yellowish-orange PSH on top of the water. Samples of the liquid hydrocarbons were sent to a laboratory for a fingerprint analysis to determine the type of hydrocarbon. Water samples were collected from the other eight wells and sent to the ES Berkeley Laboratory for further analysis. All water sampling procedures were adhered to as described in Section 5. For more details of dates of completion and water volume extracted from each well, see Appendix B.

Rising head aquifer tests were carried out on MW4, 6, 7 and 8 according to procedures defined in Section 5. Data from the tests was used to calculate the hydraulic conductivity (K) of the aquifer. Hydraulic conductivities ranged from 2.0×10^{-3} cm/sec (MW7) to 4.9×10^{-5} cm/sec (MW8) (Table 6.2). Appendix C contains aquifer test analysis sheets for each well tested. Average velocities were calculated using a gradient of .047 (19 June 1990 and 6 February 1990) and assuming a porosity of 25 percent (Table 6.2).

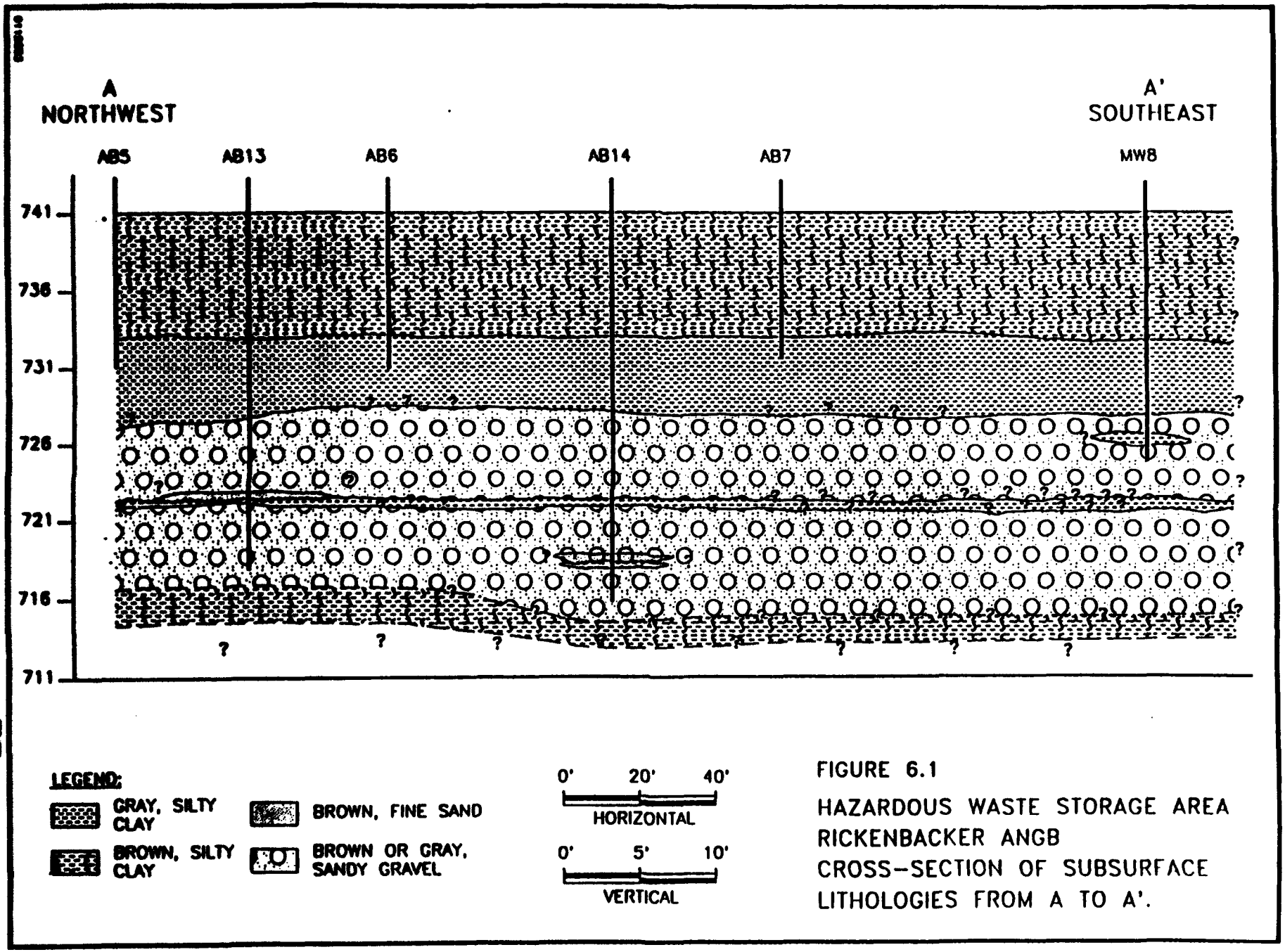
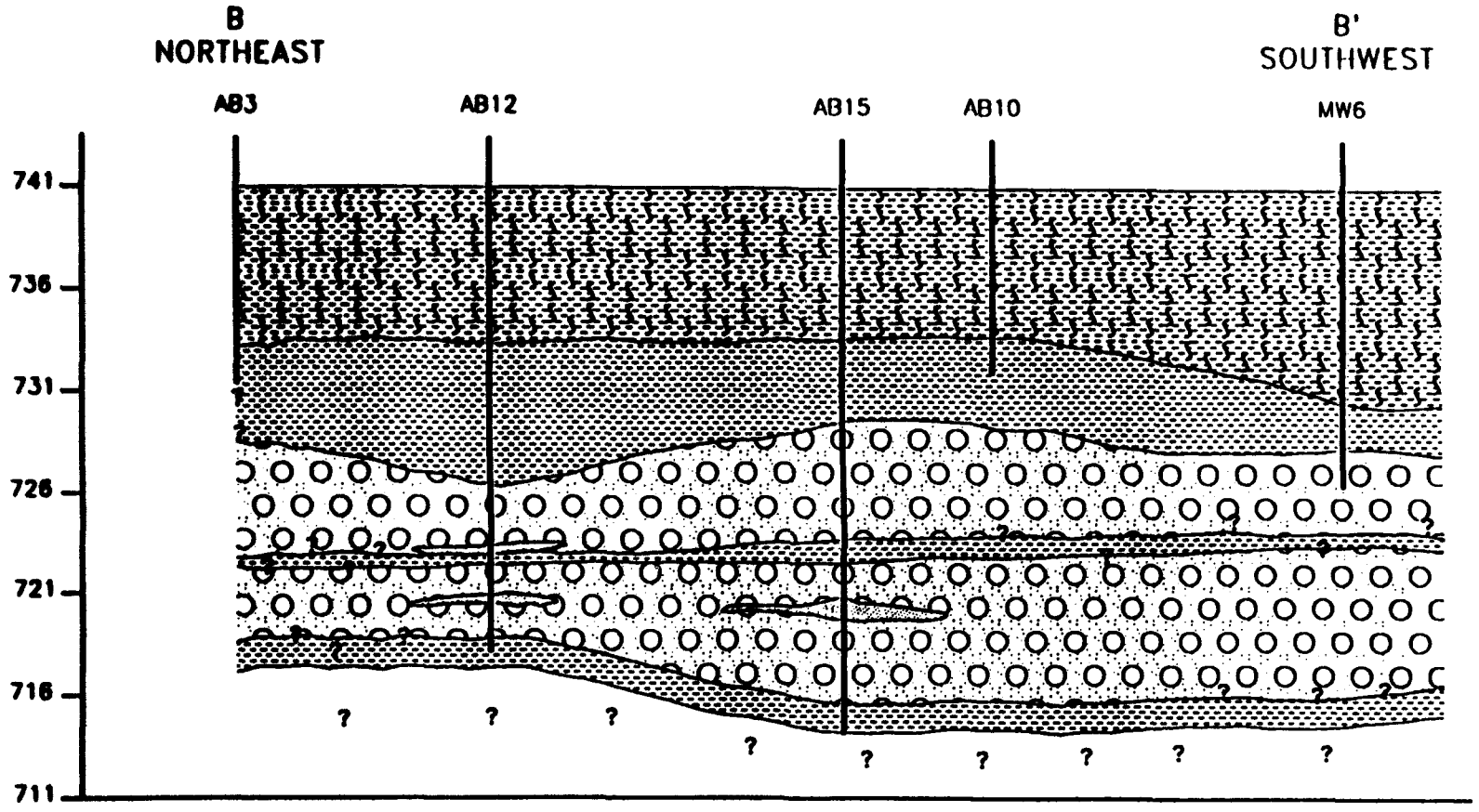


FIGURE 6.1

HAZARDOUS WASTE STORAGE AREA
RICKENBACKER ANGB
CROSS-SECTION OF SUBSURFACE
LITHOLOGIES FROM A TO A'.



LEGEND:

- GRAY, SILTY CLAY
- BROWN, SILTY CLAY
- BROWN, FINE SAND W/INTERBEDDED FINE SANDS
- BROWN OR GRAY, SANDY GRAVEL

0' 20' 40'
HORIZONTAL

0' 5' 10'
VERTICAL

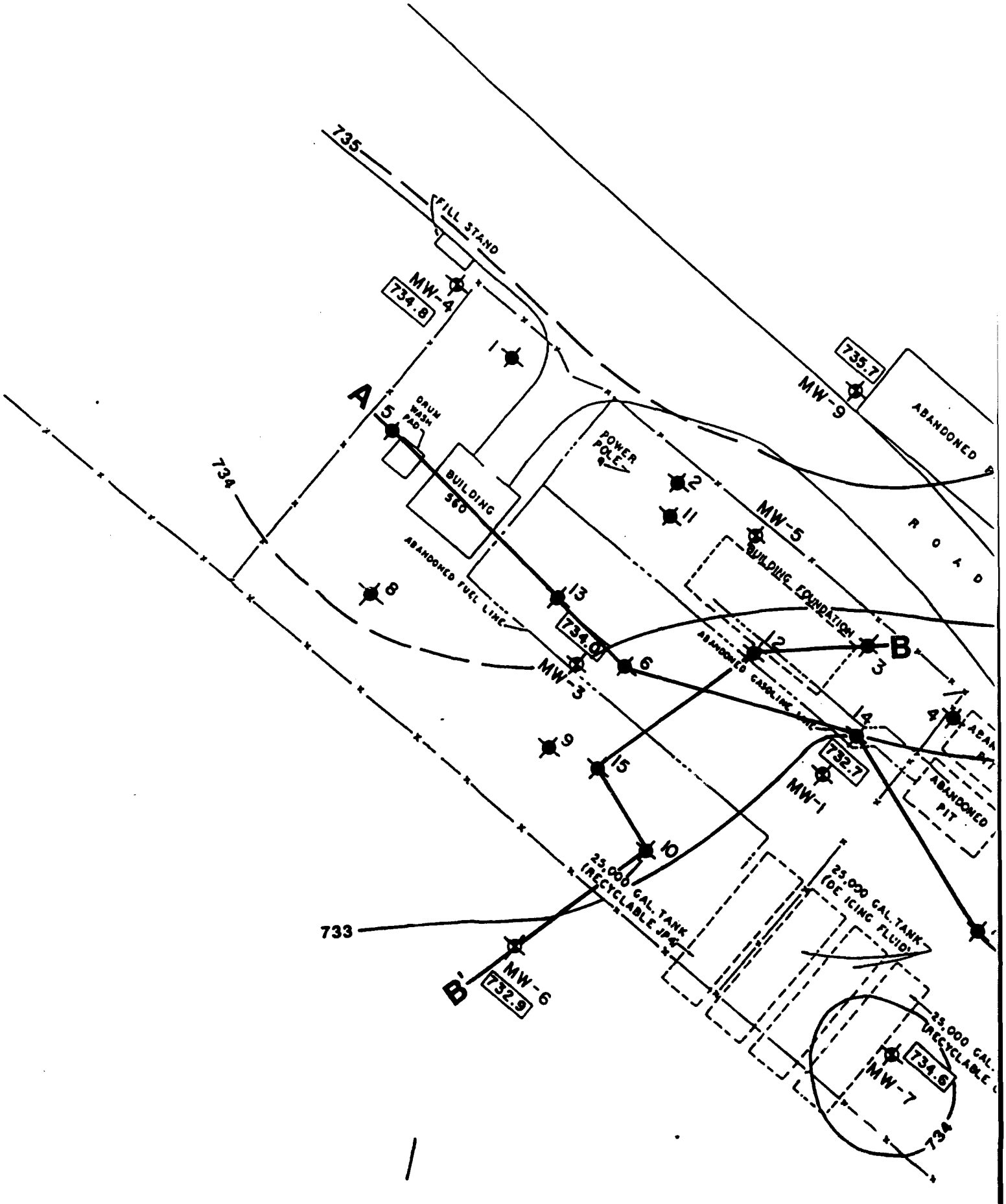
FIGURE 6.2

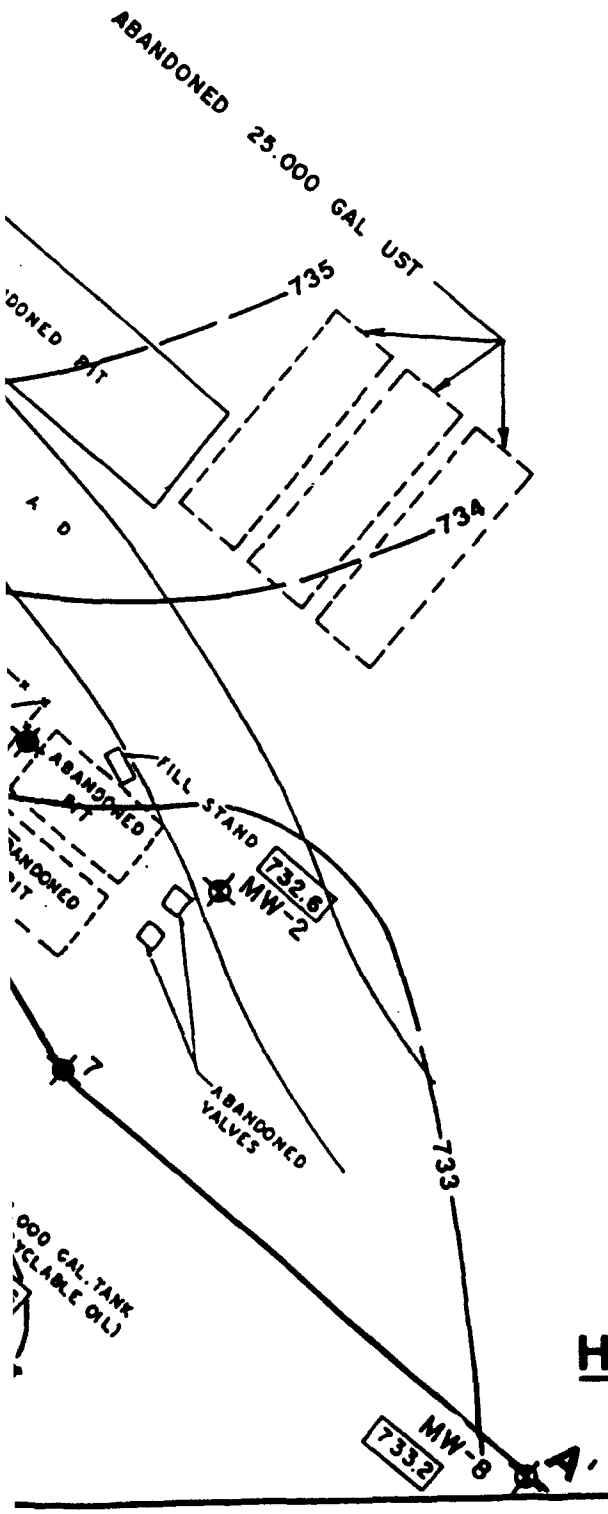
HAZARDOUS WASTE STORAGE AREA
RICKENBACKER ANGB
CROSS-SECTION OF SUBSURFACE
LITHOLOGIES FROM B TO B'

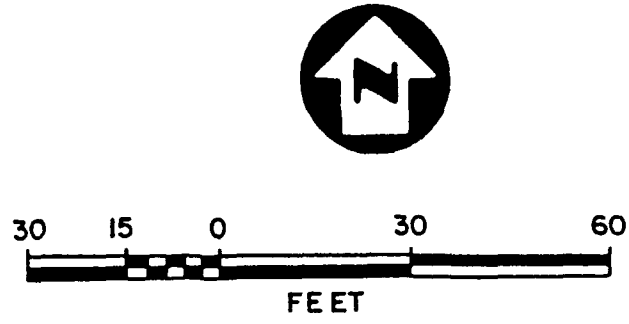
TABLE 6.1

HWSA WELL CONSTRUCTION DETAILS
Rickenbacker ANGB, Ohio

Boring/Well I.D.	Total Depth (feet)	Number of Samples Collected	Depth Intervals Analyzed (feet)	Screened Interval (feet)	Typical Static Water Level (feet)
RB-01-MW1	20	13	12.5 - 14 14 - 15	9 - 19	10.0
RB-01-MW2	15	6	0.5 - 1.5 3 - 4 5 - 6	5 - 15	9.9
RB-01-MW3	18	4	0 - 1 5 - 6	7 - 17	9.8
RB-HW-MW4	16	3	8 - 10 13 - 15	5 - 15	8.9
RB-HW-MW5	16	3	8 - 10 13 - 15	5 - 15	8.0
RB-HW-MW6	16	4	8 - 10 11 - 13 13 - 15	5 - 15	10.5
RB-HW-MW7	16	4	8 - 10 11 - 13 13 - 15	5 - 15	10.5
RB-HW-MW8	16	3	8 - 10 13 - 15	5 - 15	9.9
RB-HW-MW9	16	3	8 - 10 13 - 15	5 - 15	5.0


735
FILL STAND
MW-4
734.8
1
A
5
DRUM WASH PAD
BUILDING 360
POWER POLE
2
11
MW-5
735.7
MW-9
ABANDONED
ROAD
734
8
ABANDONED FUEL LINE
13
734.9
MW-3
6
BUILDING FOUNDATION
12
B
3
ABANDONED GASOLINE TANK
14
4
9
15
732.7
MW-1
ABANDONED PIT
10
25,000 GAL. TANK (RECYCLABLE JP4)
25,000 GAL. TANK (DE ICING FLUID)
733
B'
MW-6
732.9
MW-7
734.6
734





LEGEND :

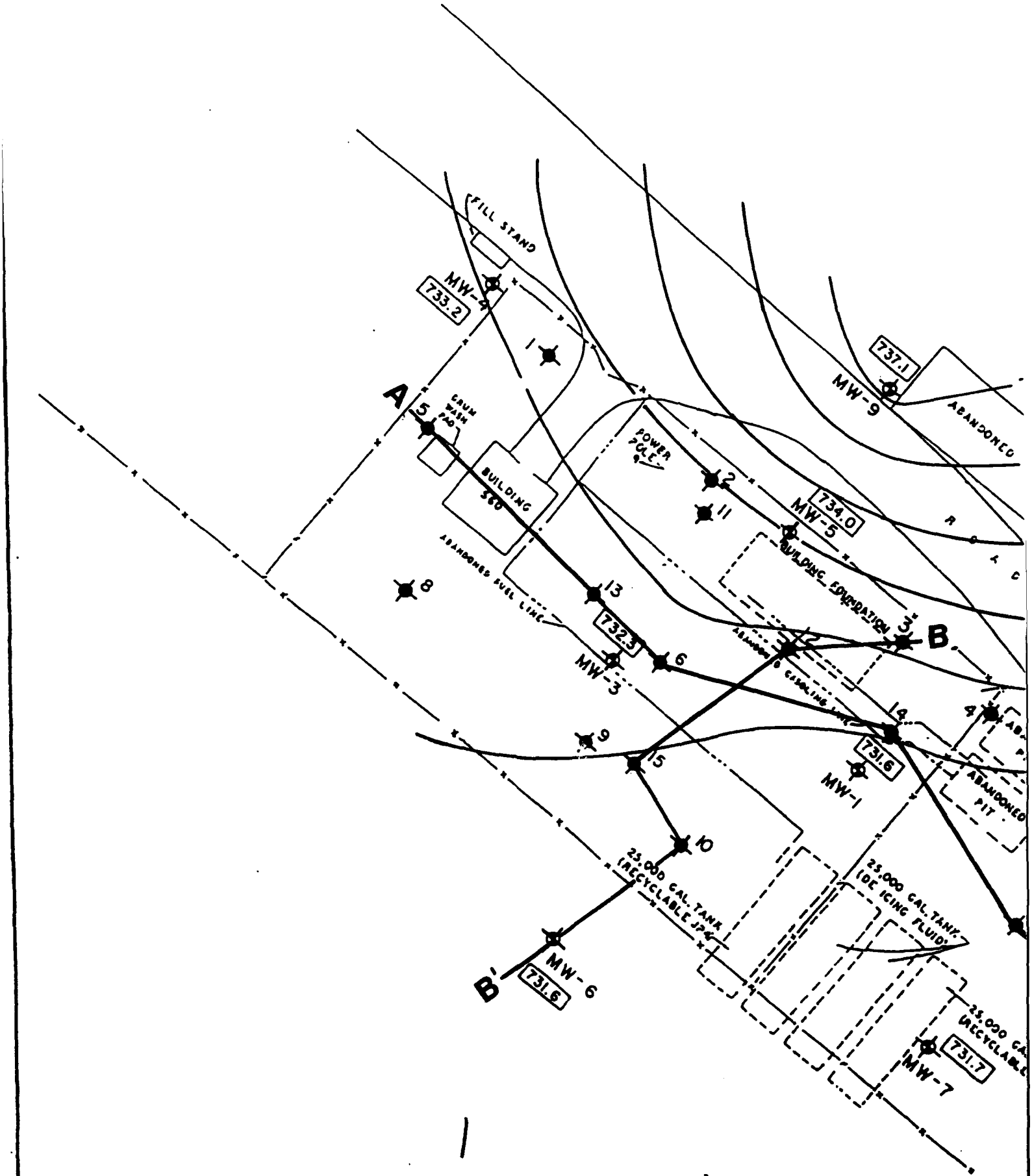
1	RB-HW-AB1
2	RB-HW-AB2
3	RB-HW-AB3
4	RB-HW-AB4
5	RB-HW-AB5
6	RB-HW-AB6
7	RB-HW-AB7
8	RB-HW-AB8
9	RB-HW-AB9
10	RB-HW-AB10
11	RB-HW-AB11
12	RB-HW-AB12
13	RB-HW-AB13
14	RB-HW-AB14
15	RB-HW-AB15

2

FIGURE 6.3

WATER SURFACE MAP
HAZARDOUS WASTE STORAGE AREA
RICKENBACKER ANGB, OHIO

6 FEBRUARY 1990


FILL STAND
MW-4
733.2
1
A
5
CRUM WASH PAD
BUILDING 560
POWER POLE
12
11
737.1
MW-9
ABANDONED
734.0
MW-5
BUILDING EXCAVATION
3
B
ABANDONED GASOLINE TANK
ABANDONED FUEL LINE
8
13
732.3
MW-3
6
9
15
14
731.6
MW-1
4
ABANDONED PIT
10
25,000 GAL. TANK (RECYCLABLE JP4)
25,000 GAL. TANK (DE ICING FLUID)
B'
MW-6
731.6
25,000 GAL (RECYCLABLE
731.7
MW-7

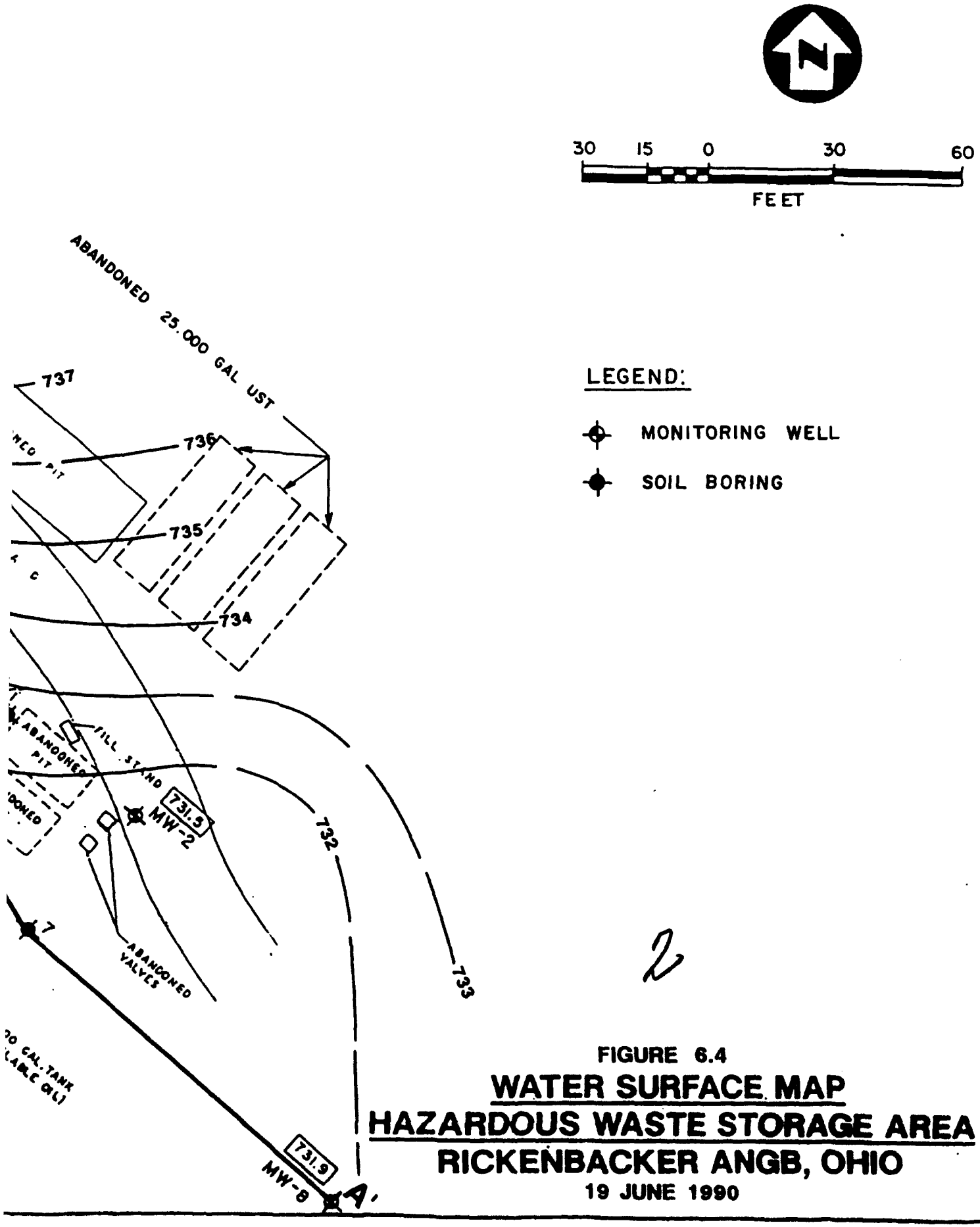


FIGURE 6.4

WATER SURFACE MAP
HAZARDOUS WASTE STORAGE AREA
RICKENBACKER ANGB, OHIO

19 JUNE 1990

6.3 ANALYTICAL RESULTS

Section 6.3.1 presents the criteria (see Table 6.3) for determining significance of the results of the Pre-Closure Sampling. The analytical results discussed in Section 6.3.2 are summarized in Tables 6.4 through 6.6 and on the Sheets in the back of this report. Only the results of the most recent sampling episode (January and February 1990) are included in these tables. Results from the previous investigation are shown on the Sheets and presented in the ES Field Investigation Report (October 1990).

6.3.1 Criteria for Determining Significance of Results

The presence of contaminants in the environment due to past materials handling practices does not mean the contaminants pose a significant, unacceptable threat to human health or the environment. The final determination for further investigative and remedial actions should be established based on estimates of risk to human health and the environment. The objective of this subsection is to define some of the criteria for determining what analytical results are significant. This is done by comparing results to background sampling done at Rickenbacker ANGB (Table 6.3 and Figure 6.5). See the Internal Draft SI Report (April 1990) for complete discussion of background sampling. For compounds not covered by the background sampling, comparisons were made to U.S. EPA, and Ohio regulatory limits. When no regulatory limits had been defined by Ohio, limits established by other states were used for discussion purposes.

6.3.1.1 Metals

Metals occur naturally in soils, sediments and water as free elements or more typically associated with other compounds. Free metallic elements play a variety of important physiological roles in all living organisms. Above certain concentrations however, these metals may act as allergens, mutagens, teratogens and carcinogens.

Establishing what concentrations of metals are significant requires some standard of naturally occurring concentration. For the purposes of this report, three sources of background metals concentrations in soil are being employed. The primary source of comparison is the results of the analysis of samples collected on the perimeter of the Base. These samples were collected expressly for the purpose of establishing background concentrations. Samples were collected from four borings advanced to 15 feet below grade at selected locations on Rickenbacker ANGB on the 8th of December

TABLE 6.2

HYDRAULIC CONDUCTIVITY AND GROUNDWATER VELOCITY
HAZARDOUS WASTE STORAGE AREA
RICKENBACKER ANGB - OHIO

Well	Hydraulic Conductivity * (cm/sec)	(feet/day)	Velocity feet/day	feet/year
MW-4	5.55×10^{-5}	0.157	.03	11
MW-6	6.75×10^{-5}	0.192	.04	15
MW-7	2.00×10^{-3}	4.32	.81	296
MW-8	4.89×10^{-5}	0.139	.03	11

* See Appendix C for calculation sheets.

** Assumed 25% porosity, gradient = .047.

1989 (see Figure 6.5). These locations were chosen to give a representative analysis of the Base and of typically natural chemical compounds in the soil. Each boring was sampled from 0-2 and 13-15 feet below grade and analyzed for total petroleum hydrocarbons (TPH) and priority pollutant metals. Chemical analyses results are recorded in Table 4.23 of Engineering-Science, Inc., April 1990 Site Inspection Report Volume 1. Background calculations for metals and TPH are presented in Table 4.24 of the same document. Results of the total metals show detectable concentrations of priority pollutant metals in all samples. The metals cadmium, mercury, selenium and silver were not detected in any sample.

Calculation of the Rickenbacker ANGB background values is based on Ohio EPA closure guidance for naturally occurring compounds. Under this guidance, background is considered equal to the arithmetic mean (μ) of a sample population plus two standard deviations (š) [μ + 2 š]. Table 4.24 of the April 1990 SI Report presents the calculated means, standard deviations and background values for the sample populations 0 to 2 feet, and all depth intervals. The upper limits of concentrations defined as background by this sampling are presented in Table 6.2. Published ranges of metals concentrations are also presented in the Table for comparison. In the following discussions of the chemical analysis results, a metal concentration is considered above background if it exceeds the Rickenbacker ANGB background, background concentrations found in the Chemical Equilibria in Soil Study and the typical Ohio farm soil concentrations.

Evaluation of metals concentrations in water in this report are based on the primary and secondary maximum contaminant level (MCL) concentrations established by the U.S. Environmental Protection Agency (U.S. EPA). These standards are established for drinking water and are only used to identify areas of potential contamination. Instances of groundwater samples exceeding the MCL do not necessarily warrant remediation.

6.3.1.2 Volatile and Semi-Volatile Organic Compounds

Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) do not occur naturally in the soil or groundwater. In the absence of any strict guidance from Ohio regulatory agencies regarding acceptable levels of these compounds significance must be determined on a basis of risk from exposure to each compound. The concentrations shown on the Sheets represent the total semi-volatile organics present at the locations indicated. Volatile organics are listed individually.

TABLE 6.3

STANDARDS FOR METALS CONCENTRATIONS IN SOIL AND DRINKING WATER
RICKENBACKER ANGB - OHIO

etal	Ohio Farm Soil[1] Concentration (mg/kg)	Chemical Equilibria[2] Concentration (mg/kg)	RANGB[3] Background (mg/kg)	Federal Drinking Water Standard (mg/L)
ntimony	NA	2 - 10	5.8	NA
rsenic	NA	1 - 50	29.5	0.05[a]
eryllium	NA	0.1 - 40	0.8	NA
admium	0 - 2.9	0.01 - 0.7	0.3	0.01[a]
hromium	4 - 23	1 - 1000	26.3	0.05[a]
opper	11 - 37	2 - 100	37.0	1.0[b]
ead	9 - 39	2 - 200	22.5	0.05[a]
ercury	NA	0.01 - 0.3	0.07	0.002[a]
ickel	9 - 38	5 - 500	41.0	NA
elenium	NA	0.1 - 2.0	1.5	0.01[a]
ilver	NA	0.01 - 5	0.2	0.05[a]
hallium	NA	NA	1.0	NA
inc	47 - 133	10 - 300	165.0	5.0[b]

- Metals in Ohio Farm Soils (Logan and Miller, 1983)

- Chemical Equilibria in Soils (W.L. Lindsay, 1979)

- Engineering-Science, Inc., April 1990 Site Investigation Report, Rickenbacker Air National Guard Base, Columbus, Ohio Volume 1, Para 4.3.24.

A - Not Available

- Primary Drinking Water MCL

- Secondary Drinking Water Standard

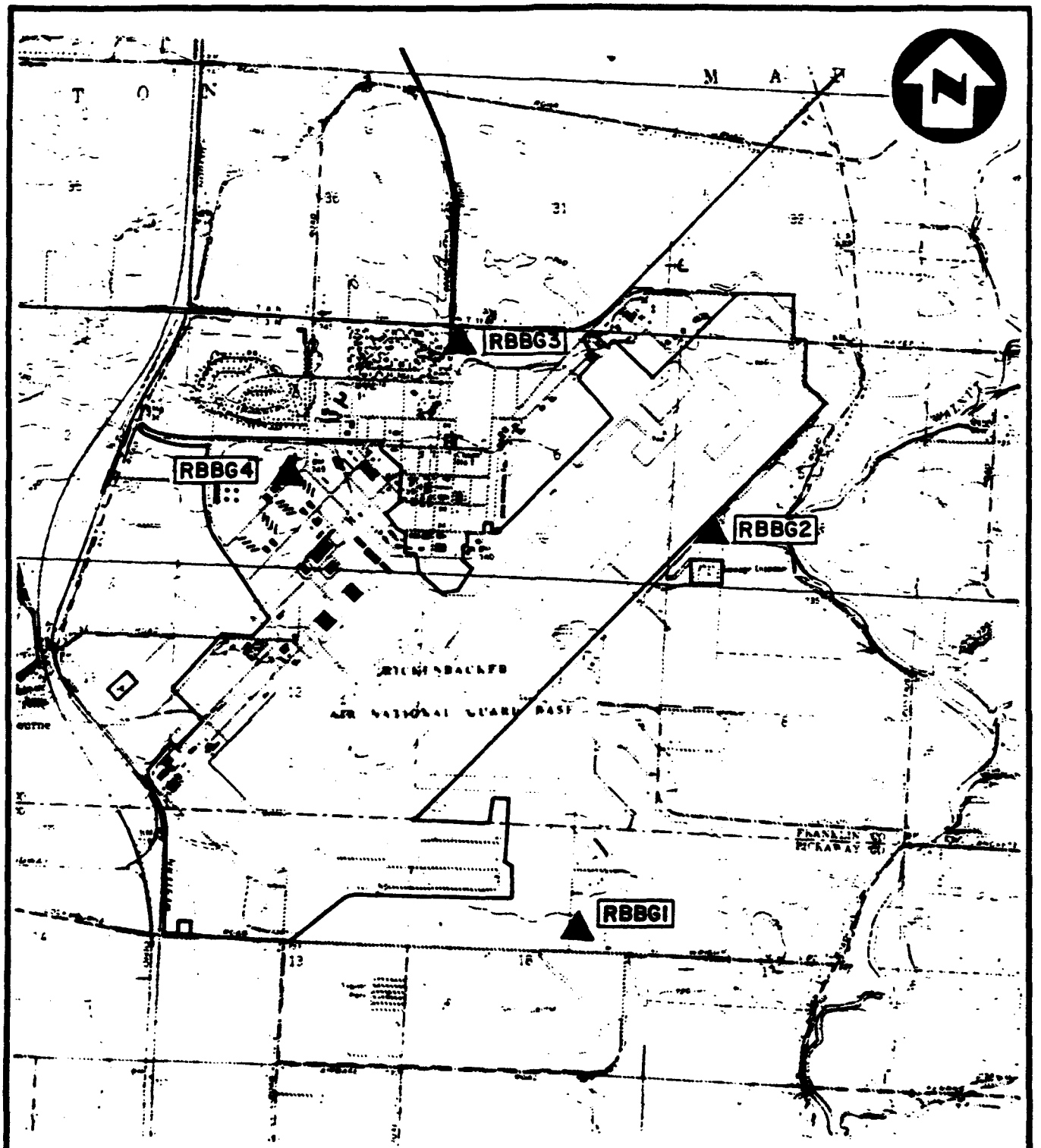


FIGURE 6.5

BACKGROUND SOIL SAMPLING LOCATIONS RICKENBACKER AIR NATIONAL GUARD BASE

6.3.2 Soil Results

In this subsection, the results from the soil analysis will be summarized in accordance with the significance of results findings. Detected compounds at each depth interval analyzed have been placed on depth specific site maps (Sheets 1 through 5). Where no volatile or semi-volatile organics were detected, a not detected symbol (ND) was placed on the map. When metals were detected above background criteria, their concentrations were placed on the maps. Summaries of the results will be divided into these depth intervals for metals, volatile organics and semi-volatile organics: 0-2', 3-5', 8-10', 13-15' and greater than 15'. Summaries of chemical compounds and their respective values are also shown in Tables 6.4 and 6.5.

6.3.2.1 Soil Results 0-2 Foot Interval

At the 0-2 foot interval lithology consisted of a dry, dark brown, silty clay topsoil, numerous compounds were detected. Total metals were found over the site with higher levels within the fenced area. Detected above background criteria (Table 6.4 & Sheet 1) were beryllium, cadmium, copper, lead, mercury, silver and zinc.

Volatile organic compounds were only analyzed for at six hand borings and two monitoring well locations. The only VOCs detected were 440,000 µg/kg o-xylene at HB1.

Total detected semi-volatile organics ranged from 150 to 164,300 µg/kg, with virtually all of the high concentrations toward the western outside perimeter of the site. Sample SU33, located in the central portion of the site, has a total semi-volatile concentration of 13,420 µg/kg (Sheet 1).

6.3.2.2 Soil Results 3-5 Foot Interval

At the 3-5 foot interval lithology consisted of a dry, medium brown, silty clay with a trace amount of pebbles. Detected compounds became more isolated in the 3-5 foot interval than in the 0-2 foot interval. Metals detected above background were beryllium, cadmium, lead, silver, thallium and zinc (see Table 6.5 and Sheet 2).

Semi-volatile organics were found at ten out of fourteen sampling locations ranging from 530 to 4,630 µg/kg. Volatile organic compounds ethylbenzene and o-xylene were

found at concentrations of 120,000 and 1,900,000 µg/kg, respectively, in HB1 near Building 560. Benzene was found in AB2 at an estimated concentration of 1J µg/kg.

6.3.2.3 Soil Results 8-10 Foot Interval

At the 8-10 foot interval, lithology consisted of a moist brown, silty clay. Metal concentrations were found below the background levels except for selenium at 1.7 mg/kg (MW8).

Volatile organics were found at levels up to 27,000 µg/kg of o-xylene at AB14. The highest concentrations were found at AB1, AB14 and MW7. Specific compounds include: benzene, ethylbenzene, xylenes and 1,1,1-trichloroethane (see Table 6.5 and Sheet 3). Total detected semi-volatile organics ranged from 130 to 1,800 µg/kg.

6.3.2.4 Soil Results 13-15 Foot Interval

At the 13-15 foot interval, lithology consisted of a wet brown to gray sand and gravel. No metals concentrations were found above the background levels, except for copper at 57.4 mg/kg at MW5. Semi-volatile organics were not detected except for a total of 620 µg/kg at MW5. Volatile organic compounds were found in the southern corner and along the northeast side of the area. These include: benzene, ethylbenzene, toluene, xylenes, acetone, trichloroethene, trans-1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride (see Table 6.5 and Sheet 4). The highest concentration was 1,000 µg/kg trans-1,2-dichloroethene at MW6.

6.3.2.5 Soil Results >15 Foot Interval

At the greater than fifteen foot interval, sand and gravel is present to a depth of approximately 25' with a thin layer of clay from 18'-19'. Detected volatile and semi-volatile organics were confined to the southeast side of the area. Semi-volatile organics were found only at MW1 at a total concentration of 1,830 µg/kg. The highest volatile organic concentrations were also found at this location. They were benzene, ethylbenzene, and o-xylene at concentrations of 1,900, 11,000, and 20,000 µg/kg, respectively.

Two other locations had detected concentrations of volatile organics. Benzene was found in AB14 at 6 μg/kg. Trichloroethene was found in AB15 at 4J μg/kg. Arsenic, copper and mercury were detected above background levels at three locations.

The trichloroethene detected in AB15 at a depth of 25-27 feet and the benzene detected in AB14 (see Sheet 5) at a depth of 21-23 feet indicate that the aquifer below the 18-19' clay confining layer has contamination in its soil and groundwater. This suggests that there may be communication between the two aquifers. This implies that the clay confining layer may not be continuous and may pinch out in a lense pattern beneath the site.

6.3.3 Groundwater Results

In this subsection, the results of the groundwater analysis are summarized on two site maps. MW1 through MW3 were installed in 1988. MW4 through MW9 were installed in 1990. The suffix GW1 indicates the first sampling of that well. Likewise, the suffix GW2 indicates the second sampling of that well. Sheet 6 summarizes the results of the volatile and semi-volatile organics analysis. Sheet 7 summarizes the results of the filtered metal analysis. This information is also shown in Table 6.6.

6.3.3.1 Volatile and Semi-Volatile Organics in the Groundwater Results

On the analytical results map (Sheet 6), both the 1990 and 1988 sampling data are shown. The only semi-volatile organic compound found in the groundwater was 2-methylnaphthalene at 5J μg/L in MW8 (see Table 6.6).

Volatile organic compounds were detected in MW1, MW3, MW6 and MW7. MW1 was sampled in 1988 and in 1990. The first sample had 94 μg/L benzene, and 20 μg/L o-xylene. The second sample had 560 μg/L benzene, 110 μg/L ethylbenzene, 35 μg/L m/p-xylene, and 86 μg/L o-xylene. MW3 was also sampled in 1988 and in 1990. The first sample had 44 μg/L trichloroethene. The second sample also had this compound at 7 μg/L. MW6 had 8 μg/L trans-1,2-dichloroethene, and 78 μg/L trichloroethene. MW7 had benzene, ethylbenzene, m/p-xylene and o-xylene at 200, 90, 21J, and 70 μg/L. In addition, four feet of phase-separated hydrocarbon were floating in MW5. Fingerprint analysis of the liquid hydrocarbons identified it as a 30 to 40 percent weathered gasoline mixed with jet fuel (Appendix F).

6.3.3.2 Filtered Metals in Groundwater Results

On the analytical results map for metals (see Table 6.6 and Sheet 7) only the 1990 water sampling data are shown since no previous filtered metal analyses had been done. Four metals were detected all at concentrations below the Federal Drinking Water Standards (Table 6.3). These four metals were arsenic found at 2.0 to 9.4 μg/L, lead found at 3.1 to 14.0 μg/L, zinc found at 5.0 to 35 μg/L and mercury at 0.11 μg/L.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU19	RB–HW–SU22	RB–HW–SU23	RB–HW–SU24
Lab ID:		1627.01	1627.04	1627.05	1627.06
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL ug/kg				
Semi–Volatiles					
2–Chlorophenol	330	--	--	--	--
3–Nitroaniline	1600	--	--	--	--
Acenaphthene	330	--	--	--	--
Dibenzofuran	330	--	--	--	--
Fluorene	330	--	--	--	--
4–Nitroaniline	1600	--	--	--	--
Phenanthrene	330	770	290 J	280 J	--
Anthracene	330	130 J	--	--	--
Fluoranthene	330	1500	600	590	140 J
Pyrene	330	1500	570	570	150 J
Benzo(a)Anthracene	330	740	280 J	260 J	--
Chrysene	330	770	320 J	290 J	--
Benzo(b)Fluoranthene	330	750	350 J	520	--
Benzo(k)Fluoranthene	330	530	--	--	--
Benzo(a)Pyrene	330	650	250 J	260 J	--
Indeno(1,2,3–cd)Pyrene	330	440	180 J	--	--
Dibenz(a,h)Anthracene	330	--	--	--	--
Benzo(g,h,i)Perylene	330	380	160 J	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW SU25–SS2	RB–HW–SU26	RB–HW–SU29	RB–HW–SU30
Lab ID:		1627.07	1627.08	1627.11	1627.12
Date Sampled:			01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL ug/kg				
Semi–Volatiles					
2–Chlorophenol	330	--	--	--	--
3–Nitroaniline	1600	--	--	--	--
Acenaphthene	330	--	--	--	--
Dibenzofuran	330	--	--	--	--
Fluorene	330	--	--	--	--
4–Nitroaniline	1600	--	--	--	--
Phenanthrene	330	--	550	--	--
Anthracene	330	--	--	--	--
Fluoranthene	330	150 J	1100	220 J	170 J
Pyrene	330	150 J	1100	260 J	210 J
Benzo(a)Anthracene	330	--	520	140 J	130 J
Chrysene	330	--	560	160 J	140 J
Benzo(b)Fluoranthene	330	--	1000	160 J	220 J
Benzo(k)Fluoranthene	330	--	--	130 J	190 J
Benzo(a)Pyrene	330	--	510	140 J	230 J
Indeno(1,2,3–cd)Pyrene	330	--	330 J	--	200 J
Dibenz(a,h)Anthracene	330	--	--	--	--
Benzo(g,h,i)Perylene	330	--	330 J	--	220 J

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW SU33–SS2	RB–HW–SU35	RB–HW–SU38	RB–HW–SU39
Lab ID:		1627.15	1627.17	1627.20	1627.21
Date Sampled:			01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL ug/kg				
Semi–Volatiles					
2–Chlorophenol	330	--	--	--	--
3–Nitroaniline	1600	--	--	--	--
Acenaphthene	330	--	--	170 J	--
Dibenzofuran	330	--	--	--	--
Fluorene	330	--	--	150 J	--
4–Nitroaniline	1600	--	--	--	--
Phenanthrene	330	920	230 J	2000	--
Anthracene	330	180 J	--	300 J	--
Fluoranthene	330	1900	420	2300	--
Pyrene	330	2300	340 J	2100	150 J
Benzo(a)Anthracene	330	1400	180 J	810	--
Chrysene	330	1400	210 J	860	--
Benzo(b)Fluoranthene	330	1400	250 J	790	--
Benzo(k)Fluoranthene	330	1200	--	590	--
Benzo(a)Pyrene	330	1300	200 J	840	--
Indeno(1,2,3–cd)Pyrene	330	600	--	560	--
Dibenz(a,h)Anthracene	330	240 J	--	--	--
Benzo(g,h,i)Perylene	330	580	--	490	--

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU40	RB–HW–SU41	RB–HW–SU42	RB–HW–SU44
Lab ID:		1627.22	1627.23	1627.24	1627.26
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL ug/kg				
Semi–Volatiles					
2–Chlorophenol	330	--	--	--	8 J
3–Nitroaniline	1600	--	--	--	24 J
Acenaphthene	330	--	--	--	2 J
Dibenzofuran	330	--	--	--	--
Fluorene	330	--	--	--	--
4–Nitroaniline	1600	--	--	--	30 J
Phenanthrene	330	130 J	--	--	18 J
Anthracene	330	--	--	--	17 J
Fluoranthene	330	300 J	330 J	160 J	16 J
Pyrene	330	340 J	300 J	190 J	39 J
Benzo(a)Anthracene	330	--	--	--	35 J
Chrysene	330	310 J	200 J	--	36 J
Benzo(b)Fluoranthene	330	300 J	240 J	--	48 J
Benzo(k)Fluoranthene	330	170 J	--	--	--
Benzo(a)Pyrene	330	150 J	170 J	--	50 J
Indeno(1,2,3–cd)Pyrene	330	--	--	--	20 J
Dibenz(a,h)Anthracene	330	--	--	--	--
Benzo(g,h,i)Perylene	330	--	--	--	56 J

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU45	RB–HW–SU46	RB–HW–SU47	RB–HW–SU48
Lab ID:		1627.27	1627.28	1627.29	1627.30
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL				
Semi–Volatiles	ug/kg				
2–Chlorophenol	330	––	––	––	––
3–Nitroaniline	1600	––	––	––	––
Acenaphthene	330	––	––	––	––
Dibenzofuran	330	––	––	––	––
Fluorene	330	––	––	––	––
4–Nitroaniline	1600	––	––	––	––
Phenanthrene	330	11000 J	5100 J	––	170 J
Anthracene	330	2200 J	970 J	––	––
Fluoranthene	330	23000 J	7500 J	160 J	380 J
Pyrene	330	25000 J	11000 J	––	270 J
Benzo(a)Anthracene	330	15000 J	5800 J	––	––
Chrysene	330	17000 J	6700 J	––	170 J
Benzo(b)Fluoranthene	330	20000 J	8400 J	130 J	––
Benzo(k)Fluoranthene	330	14000 J	6000 J	––	––
Benzo(a)Pyrene	330	15000 J	6600 J	––	130 J
Indeno(1,2,3–cd)Pyrene	330	10000 J	4800 J	––	––
Dibenz(a,h)Anthracene	330	3500 J	1900 J	––	––
Benzo(g,h,i)Perylene	330	8600 J	4700 J	––	––

Footnotes:

–– not detected, or does not exceed established criteria.

B––the analyte is found in the associated blank as well as in the sample.

J––the value reported is an estimated concentration.

U––the compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW SU49–SS3
Lab ID:		1627.37
Date Sampled:		01/31/90
Parameter	Nominal CRDL ug/kg	
Semi–Volatiles		
2–Chlorophenol	330	--
3–Nitroaniline	1600	--
Acenaphthene	330	--
Dibenzofuran	330	--
Fluorene	330	--
4–Nitroaniline	1600	--
Phenanthrene	330	240 J
Anthracene	330	--
Fluoranthene	330	450
Pyrene	330	460
Benzo(a)Anthracene	330	220 J
Chrysene	330	250 J
Benzo(b)Fluoranthene	330	320 J
Benzo(k)Fluoranthene	330	130 J
Benzo(a)Pyrene	330	220 J
Indeno(1,2,3–cd)Pyrene	330	140 J
Dibenz(a,h)Anthracene	330	--
Benzo(g,h,i)Perylene	330	--

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU19	RB–HW–SU20	RB–HW–SU21	RB–HW–SU22
Lab ID:		1627.01	1627.02	1627.03	1627.04
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Beryllium	0.5	--	1.8	--	--
Cadmium	0.5	0.68	--	--	--
Copper	2.5	--	--	--	--
Lead	0.3	110	22.9	25.7	43.8
Mercury	0.1	--	--	--	--
Silver	1	0.75 U	0.66 U	0.78 U	0.79 U
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU23	RB–HW–SU24	RB–HW SU25–SS2	RB–HW–SU26
Lab ID:		1627.05	1627.06	1627.07	1627.08
Date Sampled:		01/18/90	01/18/90		01/18/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Beryllium	0.5	0.96	--	--	--
Cadmium	0.5	--	--	0.47	1.4
Copper	2.5	--	--	--	--
Lead	0.3	52.9	68.4	22.4 N*J	90.7
Mercury	0.1	--	--	--	2.6
Silver	1	0.79 U	0.74 U	0.62 U	7.2
Zinc	2	--	--	--	203 NJ

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU27	RB–HW–SU28	RB–HW–SU29	RB–HW–SU30
Lab ID:		1627.09	1627.10	1627.11	1627.12
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL				
Metals	mg/Kg				
Beryllium	0.5	--	--	0.93	--
Cadmium	0.5	--	--	--	--
Copper	2.5	--	--	--	--
Lead	0.3	59.8	43.2	32.1	65.1
Mercury	0.1	--	--	--	--
Silver	1	0.71 U	0.75 U	0.77 U	0.81 U
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU31	RB–HW–SU32	RB–HW SU33–SS2	RB–HW–SU34
Lab ID:		1627.13	1627.14	1627.15	1627.16
Date Sampled:		01/18/90	01/18/90		01/18/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Beryllium	0.5	--	--	--	--
Cadmium	0.5	0.53 B	0.49 B	0.63	--
Copper	2.5	--	--	--	--
Lead	0.3	48.8	41.6	112 N*J	--
Mercury	0.1	--	--	--	--
Silver	1	0.87 U	0.81 U	0.83 U	0.7 U
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU35	RB–HW–SU36	RB–HW–SU37	RB–HW–SU38
Lab ID:		1627.17	1627.18	1627.19	1627.20
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	0.31 B*	--	0.37 B*
Copper	2.5	--	--	--	--
Lead	0.3	27.1	24.8 *	28.7 *	37.4 *
Mercury	0.1	--	--	--	--
Silver	1	0.74 U	0.68 U	0.7 U	0.81 U
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU39	RB–HW–SU40	RB–HW–SU41	RB–HW–SU42
Lab ID:		1627.21	1627.22	1627.23	1627.24
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Beryllium	0.5	--	--	--	--
Cadmium	0.5	0.38 B*	0.39 B*	--	--
Copper	2.5	--	--	--	--
Lead	0.3	73.4 *	44.3 *	39.2 *	35 *
Mercury	0.1	--	--	--	--
Silver	1	0.83 U	0.86 U	0.83 U	0.87 U
Zinc	2	196 N*J	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU43	RB–HW–SU44	RB–HW–SU45	RB–HW–SU46
Lab ID:		1627.25	1627.26	1627.27	1627.28
Date Sampled:		01/18/90	01/18/90	01/18/90	01/18/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	1.6 *	1.9 *	1.6 *
Copper	2.5	--	45.3 *	--	--
Lead	0.3	26.4 *	77 *	32.4 *	54.9 *
Mercury	0.1	--	--	--	--
Silver	1	0.76 U	0.77 U	0.71 U	1.8
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.4 – DETECTED COMPOUNDS IN SOILS (0'–2') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–SU47	RB–HW–SU48	RB–HW SU49–SS3
Lab ID:		1627.29	1627.30	1627.37
Date Sampled:		01/18/90	01/18/90	01/31/90
Parameter	Nominal CRDL mg/Kg			
Metals				
Beryllium	0.5	--	--	--
Cadmium	0.5	0.59 *	0.85 *	0.33 B
Copper	2.5	--	--	--
Lead	0.3	41.2 *	43.7 *	29.7 N*J
Mercury	0.1	--	--	--
Silver	1	0.77 U	0.8 U	0.72 U
Zinc	2	--	196 N*J	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

U--compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB1–SS2	RB–HW–AB2–SS1	RB–HW–AB3–SS2	RB–HW–AB4–SS2
Lab ID:		1630.02	1630.03	1633.02	1633.04
Date Sampled:		01/22/90	01/22/90	01/23/90	01/23/90
Parameter	Nominal CRDL ug/kg				
Volatiles					
Methylene_Chloride	5	--	--	--	--
Acetone	100	--	--	--	250 D
1,1–Dichloroethene	10	--	--	--	--
trans–1,2–Dichloroethene	5	--	--	--	--
1,1,1–Trichloroethane	5	--	--	--	--
Trichloroethene	5	--	--	--	--
Benzene	5	1200	1 J	39	--
Toluene	5	--	--	--	--
Vinyl chloride	10	--	--	--	--
Ethylbenzene	5	6700	--	--	20
m/p–Xylene	5	6000	--	--	36
o–Xylene	5	12000	--	--	51

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

D--result is calculated from a greater dilution than the primary analysis.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB6–SS2	RB–HW–AB7–SS1	RB–HW–AB14–SS2	RB–HW–AB14–SS7
Lab ID:		1633.06	1633.07	1637.01	1637.02
Date Sampled:		01/23/90	01/23/90	01/25/90	01/25/90
Parameter	Nominal CRDL ug/kg				
Volatiles					
Methylene_Chloride	5	--	130 B	--	--
Acetone	100	--	--	--	--
1,1–Dichloroethene	10	--	--	--	--
trans–1,2–Dichloroethene	5	--	--	--	--
1,1,1–Trichloroethane	5	--	--	--	--
Trichloroethene	5	--	--	--	--
Benzene	5	1 J	--	15000	6
Toluene	5	--	--	--	--
Vinyl chloride	10	--	--	--	--
Ethylbenzene	5	--	--	15000	--
m/p–Xylene	5	--	--	15000	--
o–Xylene	5	--	--	27000	--

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

D--result is calculated from a greater dilution than the primary analysis.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB15–SS3	RB–HW–AB15–SS8	RB–HW–MW5–SS3	RB–HW–MW6–SS3
Lab ID:		1637.04	1637.05	1647.02	1645.02
Date Sampled:		01/25/90	01/25/90	01/31/90	01/30/90
Parameter	Nominal CRDL ug/kg				
Volatiles					
Methylene_Chloride	5	--	--	--	--
Acetone	100	640	--	--	--
1,1–Dichloroethene	10	--	--	--	2 J
trans–1,2–Dichloroethene	5	--	--	--	1000 D
1,1,1–Trichloroethane	5	--	--	--	--
Trichloroethene	5	--	4 J	--	40
Benzene	5	--	--	--	--
Toluene	5	--	--	--	1 J
Vinyl chloride	10	--	--	--	59
Ethylbenzene	5	250	--	7400	--
m/p–Xylene	5	--	--	1900	--
o–Xylene	5	--	--	7000	--

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

D--result is calculated from a greater dilution than the primary analysis.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–MW7–SS2	RB–HW–MW7–SS3	RB–HW–MW8–SS3
Lab ID:		1645.03	1645.04	1645.06
Date Sampled:		01/30/90	01/30/90	01/30/90
Parameter	Nominal CRDL ug/kg			
Volatiles				
Methylene_Chloride	5	--	--	--
Acetone	100	--	--	--
1,1–Dichloroethene	10	--	--	--
trans–1,2–Dichloroethene	5	--	--	--
1,1,1–Trichloroethane	5	86 J	--	--
Trichloroethene	5	--	--	--
Benzene	5	2100	140	2 J
Toluene	5	--	4 J	--
Vinyl chloride	10	--	--	--
Ethylbenzene	5	980	--	--
m/p–Xylene	5	1800	--	--
o–Xylene	5	1200	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

B--the analyte is found in the associated blank as well as in the sample.

D--result is calculated from a greater dilution than the primary analysis.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB1–SS2	RB–HW–AB2–SS1	RB–HW–AB2–SS2	RB–HW–AB4–SS1
Lab ID:		1630.02	1630.03	1630.04	1633.03
Date Sampled:		01/22/90	01/22/90	01/22/90	01/23/90
Parameter	Nominal CRDL ug/kg				
Semi–Volatiles					
Naphthalene	330	130 J	1200	1800	--
2–Methylnaphthalene	330	--	--	--	--
Phenanthrene	330	--	--	--	--
Fluoranthene	330	--	--	--	180 J
Pyrene	330	--	--	--	180 J
Benzo(a)Anthracene	330	--	--	--	--
Chrysene	330	--	--	--	--
Benzo(b)Fluoranthene	330	--	--	--	170 J
Benzo(k)Fluoranthene	330	--	--	--	--
Benzo(a)Pyrene	330	--	--	--	--
Indeno(1,2,3–cd)Pyrene	330	--	--	--	--

Footnotes:
-- not detected, or does not exceed established criteria.
J--the value reported is an estimated concentration.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB4–SS2	RB–HW–MW5–SS3	RB–HW–AB14–SS2
Lab ID:		1633.04	1647.02	1637.01
Date Sampled:		01/23/90	01/31/90	01/25/90
Parameter	Nominal CRDL ug/kg			
Semi–Volatiles				
Naphthalene	330	880	160 J	460
2–Methylnaphthalene	330	––	460	590
Phenanthrene	330	160 J	––	––
Fluoranthene	330	160 J	––	––
Pyrene	330	120 J	––	––
Benzo(a)Anthracene	330	––	––	––
Chrysene	330	––	––	––
Benzo(b)Fluoranthene	330	––	––	––
Benzo(k)Fluoranthene	330	––	––	––
Benzo(a)Pyrene	330	––	––	––
Indeno(1,2,3–cd)Pyrene	330	––	––	––

Footnotes:
–– not detected, or does not exceed established criteria.
J––the value reported is an estimated concentration.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB1–SS1	RB–HW–AB1–SS2	RB–HW–AB2–SS1	RB–HW–AB2–SS2
Lab ID:		1630.01	1630.02	1630.03	1630.04
Date Sampled:		01/22/90	01/22/90	01/22/90	01/22/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--		--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	0.47 B	0.35 B	0.34 B	0.35 B
Copper	2.5	--	--	--	--
Lead	0.3	--	22.8 *	--	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.78 U	0.77 U	0.75 U	0.77 U
Thallium	1	1.2 BNJ	--	1.1 BNJ	--
Zinc	2	--	--	--	--

Footnotes:
-- not detected, or does not exceed established criteria.
*--diplicate analysis not within control limits.
B--reported vaule is less than the reporting limit, but greater than the IDL.
J--the value reported is an estimated concentration.
N--spiked sample recovery not within control limits.
U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB3–SS1	RB–HW–AB3–SS2	RB–HW–AB4–SS1	RB–HW–AB4–SS2
Lab ID:		1633.01	1633.02	1633.03	1633.04
Date Sampled:		01/23/90	01/23/90	01/23/90	01/23/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	1	--
Cadmium	0.5	0.58	0.45 B	0.5 B	0.45 B
Copper	2.5	--	--	--	--
Lead	0.3	--	--	382 *	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.77 U	0.74 U	0.83 U	0.74 U
Thallium	1	--	--	--	--
Zinc	2	--	--	166	--

Footnotes:
-- not detected, or does not exceed established criteria.
*--diplicate analysis not within control limits.
B--reported vaule is less than the reporting limit, but greater than the IDL.
J--the value reported is an estimated concentration.
N--spiked sample recovery not within control limits.
U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB5–SS1	RB–HW–AB5–SS2	RB–HW–AB6–SS1	RB–HW–AB6–SS2
Lab ID:		1630.05	1630.06	1633.05	1633.06
Date Sampled:		01/22/90	01/22/90	01/23/90	01/23/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	0.45 B	--	3.3	0.49
Copper	2.5	--	--	--	--
Lead	0.3	--	--	--	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.74 U	0.74 U	0.73 U	0.64 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--diplicate analysis not within control limits.

B--reported vaule is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery not within control limits.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB7–SS1	RB–HW–AB7–SS2	RB–HW–AB8–SS1	RB–HW–AB8–SS2
Lab ID:		1633.07	1633.08	1630.07	1630.08
Date Sampled:		01/23/90	01/23/90	01/22/90	01/22/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	0.38 B	0.55	0.68	0.37 B
Copper	2.5	--	--	--	--
Lead	0.3	--	--	--	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.83 U	0.72 U	0.74 U	0.82 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:
-- not detected, or does not exceed established criteria.
*--diplicate analysis not within control limits.
B--reported vaule is less than the reporting limit, but greater than the IDL.
J--the value reported is an estimated concentration.
N--spiked sample recovery not within control limits.
U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB9–SS1	RB–HW–AB9–SS2	RB–HW–AB10–SS1	RB–HW–AB10–SS2
Lab ID:		1633.09	1633.10	1633.11	1633.12
Date Sampled:		01/23/90	01/23/90	01/23/90	01/23/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	0.49 B	0.51 B	0.35 B	0.24 B
Copper	2.5	--	--	--	--
Lead	0.3	27.7 S	--	--	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.81 U	0.84 U	0.76 U	0.79 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:
-- not detected, or does not exceed established criteria.
*--diplicate analysis not within control limits.
B--reported vaule is less than the reporting limit, but greater than the IDL.
J--the value reported is an estimated concentration.
N--spiked sample recovery not within control limits.
U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB11–SS4	RB–HW–AB11–SS7	RB–HW–AB12–SS3	RB–HW–AB12–SS7
Lab ID:		1643.07	1643.08	1636.01	1636.02
Date Sampled:		01/26/90	01/26/90	01/24/90	01/24/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	--	0.44 B	--
Copper	2.5	51.3 NJ	--	--	--
Lead	0.3	--	--	37 N*J	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.45 U	0.44 U	0.73 U	0.63 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--diplicate analysis not within control limits.

B--reported vaule is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery not within control limits.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB13–SS5	RB–HW–AB13–SS7	RB–HW–AB14–SS2	RB–HW–AB14–SS7
Lab ID:		1636.03	1636.04	1637.01	1637.02
Date Sampled:		01/24/90	01/24/90	01/25/90	01/25/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	61.2
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	--	--	--
Copper	2.5	42.8 NJ	42.9 NJ	--	46 NJ
Lead	0.3	--	--	--	22.9 N*J
Mercury	0.1	0.17	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.69 U	0.29 U	0.55 U	0.53 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:
-- not detected, or does not exceed established criteria.
*--diplicate analysis not within control limits.
B--reported vaule is less than the reporting limit, but greater than the IDL.
J--the value reported is an estimated concentration.
N--spiked sample recovery not within control limits.
U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–AB15–SS3	RB–HW–AB15–SS8	RB–HW–MW4–SS2	RB–HW–MW4–SS3
Lab ID:		1637.04	1637.05	1643.04	1643.05
Date Sampled:		01/25/90	01/25/90	01/29/90	01/29/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	--	--	0.68
Copper	2.5	--	--	--	--
Lead	0.3	--	--	--	--
Mercury	0.1	--	0.16	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.8 U	0.43 U	0.52 U	0.56 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--diplicate analysis not within control limits.

B--reported vaule is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery not within control limits.

U--the compound was analyzed for, but not detected.

TABLE 6.5 – DETECTED COMPOUNDS IN SOILS (3'–27') AT THE HWSA RICKENBACKER ANGB–OHIO

Sample ID:		RB–HW–MW5–SS2	RB–HW–MW5–SS3	RB–HW–MW6–SS2	RB–HW–MW6–SS3
Lab ID:		1647.01	1647.02	1645.01	1645.02
Date Sampled:		01/31/90	01/31/90	01/30/90	01/30/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	--	0.33 B	--
Copper	2.5	--	57.4 *	--	--
Lead	0.3	--	--	--	--
Mercury	0.1	--	--	--	--
Selenium	0.5	--	--	--	--
Silver	1	0.75 U	0.7 U	0.72 U	0.65 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:
-- not detected, or does not exceed established criteria.
*--diplicate analysis not within control limits.
B--reported vaule is less than the reporting limit, but greater than the IDL.
J--the value reported is an estimated concentration.
N--spiked sample recovery not within control limits.
U--the compound was analyzed for, but not detected.

Sample ID:		RB-HW-MW7-SS2	RB-HW-MW7-SS3	RB-HW-MW8-SS2	RB-HW-MW8-SS3
Lab ID:		1645.03	1645.04	1645.05	1645.06
Date Sampled:		01/30/90	01/30/90	01/30/90	01/30/90
Parameter	Nominal CRDL mg/Kg				
Metals					
Arsenic	1	--	--	--	--
Beryllium	0.5	--	--	--	--
Cadmium	0.5	--	--	--	--
Copper	2.5	--	--	--	--
Lead	0.3	--	25.2 NSJ	--	--
Mercury	0.1	--		--	--
Selenium	0.5	--	--	1.7 NSJ	--
Silver	1	0.71 U	0.83 U	0.73 U	0.83 U
Thallium	1	--	--	--	--
Zinc	2	--	--	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--diplicate analysis not within control limits.

B--reported vaule is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery not within control limits.

U--the compound was analyzed for, but not detected.

Sample ID:		RB-HW-MW9-SS2	RB-HW-MW9-SS3
Lab ID:		1665.03	1665.04
Date Sampled:		02/09/90	02/09/90
Parameter	Nominal CRDL mg/Kg		
Metals			
Arsenic	1	--	--
Beryllium	0.5	--	--
Cadmium	0.5	0.31 B	--
Copper	2.5	--	--
Lead	0.3	--	--
Mercury	0.1	--	--
Selenium	0.5	--	--
Silver	1	0.68 U	0.68 U
Thallium	1	--	--
Zinc	2	--	--

Footnotes:

-- not detected, or does not exceed established criteria.

*--diplicate analysis not within control limits.

B--reported vaule is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery not within control limits.

U--the compound was analyzed for, but not detected.

Sample ID:		RB-HW-MW1-GW2	RB-HW-MW3-GW2	RB-HW-MW6-GW1	RB-HW-MW7-GW1
Lab ID:		1657.03	1657.02	1657.12	1657.13
Date Sampled:		02/06/90	02/06/90	02/07/90	02/07/90
Parameter	Nominal CRDL ug/L				
Volatiles					
trans-1,2-Dichloroethene	5	--	--	8	--
Trichloroethene	5	--	7	78	--
Benzene	5	560 D	--	--	200
Ethylbenzene	5	110	--	--	90
m/p-Xylene	5	35	--	--	21 J
o-Xylene	5	86	--	--	70

Footnotes:

-- not detected, or does not exceed established criteria

D--result is calculated from a greater dilution than the primary analysis.

J--the value reported is an estimated concentration.

U--the compound was analyzed for, but not detected.

Sample ID:		RB-HW-MW8-GW1
Lab ID:		1657.15
Date Sampled:		02/07/90
Parameter	Nominal CRDL ug/L	
Semi-Volatiles		
2-Methylnaphthalene	10	5 J

Footnotes:

-- not detected, or does not exceed established criteria

J--the value reported is an estimated concentration.

Sample ID:		RB-HW-MW1-GW2 Filtered	RB-HW-MW2-GW2 Filtered	RB-HW-MW3-GW2 Filtered
Lab ID:		1657.03	1657.09	1657.02
Date Sampled:		02/06/90	02/07/90	02/06/90
Parameter	Nominal CRDL ug/L			
Metals				
Arsenic	10	9.4 B	4.2 BW	2 B
Beryllium	5	--	--	--
Cadmium	10	--	--	--
Chromium	50	--	--	--
Copper	25	--	--	--
Lead	20	7.7 S	14.0 W	5.3
Mercury	0.2	0.11 B	--	--
Nickel	40	--	--	--
Selenium	10	--	--	--
Silver	50	--	--	--
Zinc	20	10 BJ	18.0 J	17.0 BJ

Footnotes:

-- not detected, or does not exceed established criteria.

+--correlation co-efficient for the MSA is less than 0.995.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

S--reported value was determined by the Method of Standard Additions.

U--compound was analyzed for, but not detected.

W--post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

Sample ID:		RB-HW-MW4-GW1 Filtered	RB-HW-MW6-GW1 Filtered	RB-HW-MW7-GW1 Filtered
Lab ID:		1657.04	1657.12	1657.13
Date Sampled:		02/06/90	02/07/90	02/07/90
Parameter	Nominal CRDL ug/L			
Metals				
Arsenic	10	--	--	6.9 B
Beryllium	5	--	--	--
Cadmium	10	--	--	--
Chromium	50	--	--	--
Copper	25	--	--	--
Lead	20	12.5	3.1	4.9
Mercury	0.2	--	--	--
Nickel	40	--	--	--
Selenium	10	--	--	--
Silver	50	--	--	--
Zinc	20	10 BJ	5 BJ	8 BJ

Footnotes:

-- not detected, or does not exceed established criteria

+--correlation co-efficient for the MSA is less than 0.995.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

S--reported value was determined by the Method of Standard Additions.

U--compound was analyzed for, but not detected.

W--post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

Sample ID:		RB-HW-MW8-GW1 Filtered	RB-HW-MW9-GW1 Filtered
Lab ID:		1657.15	1669.01
Date Sampled:		02/07/90	02/16/90
Parameter	Nominal CRDL ug/L		
Metals			
Arsenic	10	3.1 BW	2 B
Beryllium	5	--	--
Cadmium	10	--	--
Chromium	50	--	--
Copper	25	--	--
Lead	20	6.0	3.6
Mercury	0.2	--	--
Nickel	40	--	--
Selenium	10	--	--
Silver	50	--	--
Zinc	20	21.0 J	13 BJ

Footnotes:

-- not detected, or does not exceed established criteria

+--correlation co-efficient for the MSA is less than 0.995.

*--duplicate analysis not within control limits.

B--reported value is less than the reporting limit, but greater than the IDL.

J--the value reported is an estimated concentration.

N--spiked sample recovery, not within control limits.

S--reported value was determined by the Method of Standard Additions.

U--compound was analyzed for, but not detected.

W--post digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

SECTION 7.0

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The analytical results indicate soil contamination in widely spaced areas of the HWSA down to depths of over fifteen feet, as well as contamination of the groundwater with organic solvents and fuel components. Consequently, removal of all of the contamination, to effect a clean closure is not a practical alternative. Even if soil were removed to a depth of 15 feet, groundwater remediation is necessary and would require an extended groundwater monitoring program. In addition, the extent of groundwater contamination south of the site and in the second aquifer and the extent of surface contamination at the western corner are unknown.

The association of the phase-separated hydrocarbons (PSH) in MW5 with the existing UST system adjacent to the HWSA required notification of the Ohio Bureau of Underground Storage Tank Regulations (BUSTR). At the request of BUSTR, additional investigation of the USTs was conducted. Those investigative results are the subject of a separate report (ES, Phase-Separated Hydrocarbons, 1990). The existence of the PSH places the removal of fuel components from the groundwater under BUSTR jurisdiction while all other contamination remains within RCRA jurisdiction.

7.2 RECOMMENDATIONS

In light of the preceding conclusions, additional sampling activities should be conducted to determine the extent of groundwater contamination downgradient from the site and to determine the extent of surface soil contamination near the western corner of the fenced area.

The Closure Plan will need to be revised to account for the more extensive contamination. A landfill closure requiring long-term monitoring of groundwater at the site will probably be required. Such a closure could be implemented in three ways.

Option 1 would be to fence the area containing contaminated surface soils, install downgradient monitoring wells and implement a periodic sampling program. This

option will require a determination of minimal risk to human health and the environment from leaving the contaminated surface soils in place and uncovered.

Option 2 would be implemented if leaving the soils uncovered is determined to be an unacceptable risk. In that event, the site would be covered with a geotextile and clay cap prior to fencing. The groundwater monitoring program would be identical to Option 1.

Option 3 would be implemented if leaving all of the contaminated soils is place is determined to be an unacceptable risk. In that event the upper few feet of the most contaminated soil would be removed prior to backfilling and capping as in Option 2.

Included in the scope of closure for all options would be implementing remedial action with regard to the groundwater contamination. A likely remedial action would be pumping and treating the groundwater.

SECTION 8.0
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APPENDIX A

BORING LOGS

REV. DATE: JAN 1989

RING LOG	BORING/WELL NO.: RB-HW-AB1		Page 1 of 1
llation: Rickenbacker ANGB		Site: HWSA	
ct No.: CL452.03	Client/Project: RANGB/Hazardous Waste Storage Area		
NRAP Contractor: E-S Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: D Wright	
Started: 1/22/90 (10:00 a.m)	Drlg Ended: 1/22/90 (10:30 a.m)	Borehole dia(s): 6"	
Method/Rig Type: Hollow stem auger + Split spoon / CME 75TA			
ied by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D	

(1) Sample No.	Lab An. (Y/N)	Micro. (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3-5'	Y/SS1	3.5	0 70	CLAY light to medium brown, silty, w/ pebbles (10%) No odors.		5 5 5 5				
8-10'	Y/SS2	16.6	0 70	CLAY medium to dark brown, silty, to 9.5'. Light to medium gray, silty from 9.5' to 10'. No odors. Moist.		3 5 5 6				
				TD = 10'						
C	D	E	F	G	H	I	J	K	L	M	N

T = Thin wall tube R = Rock coring ____ Field G/C (Make/Mod.) ____
S = Split spoon (tube) O = Other ____ G/C Oper.: ____
C = Cuttings Notes: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AB2	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: 0L452.03	Client/Project: RANGB/Hazardous Waste Storage Area	
HAZWRAP Contractor: E-5 Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: D. Wright
Drlg Started: 1/22/90 (15:00 p m)	Drlg Ended: 1/22/90 (15:30 p m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: G.O Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample	Sample No.	Lab Anal (Y/N)	Recovery (in)	USCS	Lithologic Description	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3-5'	X	V551	35.1	0	10	CLAY medium to dark brown, silty. No odors.	2 3 4 6				
8-10'	X	V552	12.7	0	10	CLAY light to medium gray, silty. No odors. Moist.	2 5 7 7				
						TD = 10'					

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AB3	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: CL452.03	Client/Project: RANGB/ Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J Mathes & Assoc	Driller: D Wright
Drlg Started: 1/23/90 (8:45 am)	Drlg Ended: 1/23/90 (9:00 am)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: G.O. Carpenter	E-Log (Y/(N)) From _____ to _____	Protection Level: D

Depth (ft)	Sample	Sample No.	Lab Anal. (Y/N)	Micro TVA (ppm)	Recovery (ft)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
5	X	B-5'	Y/N	78.5	0 / 10	CLAY medium brown, sandy Hydrocarbon staining. Strong odors.		1 2 1 2				
0	X	B-10'	Y/N	46.3	0 / 10	CLAY light to medium gray, silty. No odors. Moist.		2 3 4 6				
5												
0												
5												
0						TD = 10'						

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring _____
O = Other _____
Notes: _____
Field G/C (Make/Mod.) _____
G/C Oper.: _____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AR4	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
AZWRAP Contractor: E-J Inc	Drlg Contractor: J. Mathes & Assoc	Driller: O. Wright
Drlg Started: 1/23/90 (13:20 p m)	Drlg Ended: 1/23/90 (13:30 p m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow-stem auger / Split spoon / CME 75 TA		
Logged by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	Recovery (%)	USCS	Lithologic Description	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3'-5'	V/SS#1		30	CLAY	brown, silty. (W) / concrete/rock debris. No odors.	8 14				
8'-10'	V/SS#2		25	CLAY	gray, sandy. Black stained, hydrocarbons. Strong odor. Moist	1 5 3 6				

TD = 10'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring
O = Other
Notes:
Field G/C (Make/Mod.)
G/C Oper.:

REV. DATE: JAN 1989

ORING LOG	BORING/WELL NO.: RB-HW-ABS	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
AZWRAP Contractor: E-S Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: D. Wright
Drlg Started: 1/22/90 (14:30 pm)	Drlg Ended: 1/22/90 (15:00 pm)	Borehole dia(s): 6"
Rig Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: GD. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample	Sample No.	Lab Anal: (Y)N	Micro in hood (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3-5'	S	SS1		8.5	70	CLAY light to medium brown, silty, w/ pebbles (10%). No odors.		5 7 12				
8-10'	S	SS2		11.9	70	CLAY light to medium gray, silty, trace sand (<10%). No odors. Moist		2 2 3 6				

TD = 10'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring
O = Other
Notes:
Field G/C (Note/Mod.)
G/C Oper.:

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AB6	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: 04452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-5 Inc.	Drlg Contractor: J. Mathes & Assoc.	Driller: O. Wright
Drlg Started: 1/23/90 (11:00 a.m.)	Drlg Ended: 1/23/90 (11:30 a.m.)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75TA		
Logged by: G.D. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Type	Lab Anal. (Y/N)	Recovery (in)	Headspace (ppm)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3'-5'		S	N	10	14.6	CLAY brown, silty. W/ pebble debris (10%). No odors.		1 2 3 6				
8'-10'		S	N	10	13.1	CLAY brown to gray, sandy. No odors. Moist.		3 5 7 12				
						TD = 10'						

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring
O = Other
Notes:
Field G/C (Make/Mod.)
G/C Oper.:

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AB7	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
AZWRAP Contractor: E-J Inc.	Drlg Contractor: J. Mathes & Assoc.	Driller: D Wright
Drlg Started: 1/23/90 (14:00 p m)	Drlg Ended: 1/23/90 (14 : 30 p m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75TA		
Logged by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal: (Y/N)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
0-5'	S-1	N	70	CLAY medium brown, silty. No odors		1 3 5 6				
5-10'	S-2	N	70	CLAY gray, sandy. No odors. Moist.		2 3 4 5				

TD = 10'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AB8	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: CL452.03	Client/Project: RANGB/ Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J Mathes & Assoc.	Driller: D Wright
Drlg Started: 1/22/90 (13:20 pm)	Drlg Ended: 1/22/90 (13:50 pm)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger / Split spoon / CME 75TA		
Logged by: G.G. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Lab Anal. (Y/N)	Micro Hasp (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3-5'	Y5551		5.7	0	70	CLAY	light to medium brown, silty, w/ pebbles (10%). No odors.		3 6 9 11		
8-10'	Y5552		22.0	0	70	CLAY	medium to dark brown, silty, w/ pebbles (10%) No odors. Moist.		2 4 5 5		

TD = 10'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

ORING LOG	BORING/WELL NO.: RB-HW-AB9		Page 1 of 1
stallation: Rickenbacker ANGB		Site: HWSA	
oject No.: CL452.03	Client/Project: RANGB/ Hazardous Waste Storage Area		
AZWRAP Contractor: E-S Inc	Drlg Contractor: J. Mathes & Assoc	Driller: D. Wright	
rlg Started: 1/23/90 (9:30 am)	Drlg Ended: 1/23/90 (9:45 am)	Borehole dia(s): 6"	
rlg Method/Rig Type: Hollow stem auger / Split spoon / CME75TA			
ogged by: G.D. Carpenter	E-Log (Y/N) From ____ to ____		Protection Level: D

th (ft)	Sample	Sample No.	Lab Anal. (Y/N)	Microtip (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth & Remarks	Elev. (ft)
	X	3'-5'	U/SS1	13.6	0	70 CLAY medium brown, silty, w/ pebbles (10%) No odors.		1 2 3 4				
	X	8'-10'	U/SS2	19.8	0	70 CLAY gray silty, w/ pebbles (10%). No odors. Moist		1 2 3 4				

TD=10'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ______
O = Other ______
Notes: ______
Field G/C (Make/Mod.) ______
G/C Oper.: ______

REV. DATE: JAN 1989

ORING LOG	BORING/WELL NO.: RB-HW-ABIO	Page 1 of 1
stallation: Rickenbacker ANGB	Site: HWSA	
roject No.: CC452.03	Client/Project: RANGB/Hazardous Waste Storage Area	
AZWRAP Contractor: E-5 Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: O. Wright
rlg Started: 1/23/90 (: m)	Drlg Ended: 1/23/90 (: m)	Borehole dia(s):
rig Method/Rig Type:		
ogged by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft) Sample	Sample No. Lab Anal. (Y/N)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch. Graphic Log Well data	Water depth & Remarks	Elev (ft)
3.5' U/SS	31.3	0 70	CLAY medium brown, silty. No odors.		3321		
8.10' U/SS	184	0 70	CLAY dark brown to gray, silty. No odors. Moist.		3231		

TD = 10'

U = Thin wall tube R = Rock coring ____ Field G/C (Make/Mod.) ____

S = Split spoon (tube) O = Other ____ G/C Oper.: ____

C = Cuttings Notes: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RA-HG1-AB11	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: 22452.03	Client/Project: ANGB/Hazardous Waste Storage Area	
HAZWRAP Contractor: E-J Inc.	Drlg Contractor: J. Mathes Assoc.	Driller: D. Wright
Drlg Started: 1/26/90 (9:50 am)	Drlg Ended: 1/26/90 (11:20 am)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger / Split spoon / CME 75TA		
Logged by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	Recovery (ft)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
	3-5'	N	2.0	CLAY brown, silty. No odors.		2 4 4				
	8-10'	N	1.5	Clay brown, silty. No odors.		6 4 WD				
	13-15'	N	2.0	Clay brown, silty. W/ pebbles (10%). No odors. Moist.		9 4 WD				
				Gravel - brown, sandy. No odors. Wet.		5 3 2				
				Gravel - brown, sandy. No odors. Wet. Gray silty clay @ 18.5' to 19.0'.		5 7 11 14				
				Gravel - brown, sandy. to 19.5' Gray sandy gravel from 19.5' to 21'. No odors. Wet.		11 21 22 22				
				Gravel - brown, sandy. No odors. Wet.		7 11 23 30				
				TD = 23'						

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____

Field G/C (Meko/Med.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: LB-HW-AG12	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: CL452.03	Client/Project: RANGB/Hazardous Waste Storage Area	
HAZWRAP Contractor: E-J Inc.	Drlg Contractor: J. Mathes & Assoc.	Driller: O Wright
Drlg Started: 1/24/90 (9:10 a.m)	Drlg Ended: 1/24/90 (10:30 a.m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger / Split spoon / CME 75 TA		
Logged by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Type	Lab Anal. (Y/N)	Mucca ic (ppm)	Headspace (ppm)	Recovery (%)	USCS	Lithologic Description	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
	3-5'	SS1		9.5	0	70	CL	CLAY medium brown, silty. w/ pebbles (10%). No odors.	2 2 10 10				
0	8-10'	SS2		6.1	0	70	CL	CLAY dark brown, sandy. Cinder/pebble debris (<10%). No odors. Moist	2 3 6 10				
	13-15'	SS3	Y	94.8	0	70	CL	CLAY brown, sandy. Hydrocarbon staining. Grayish sand from 14.5-15'. Fine to medium grained. Well sorted. Wet.	2 4 8 11				
5	17-19'	SS4	Y	89.5	0	70	SW	Sand - medium. Small gravel throughout (50%). Hydrocarbon staining Slight odor. Wet.	3 7 11 12				
	21-23'	SS5	Y	0.1	0	70	SW	Sand - medium grained, sand/gravel to 18'. brown well sorted Fine sand @ 18-18.5'. Gray silty clay @ 18.5-19'. No odors. Wet.	5 11 19 20				
0	23-25'	SS6	Y	0.3	0	70	GW	Gravel - sandy From 19-20.5'. Brown well sorted fine sand, From 20.5' to 21'. No odors. Wet.	0 5 13 15				
	25-27'	SS7	Y	0.0	0	70	GW	Gravel - sandy, From 21-22.5'. Light gray hard clay. Wet. No odors.	5 16 20 24				
0								TD = 23'					

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

ORING LOG	BORING/WELL NO.: RA-HW-AB13	Page 1 of 1
stallation: Rickenbacker ANGB	Site: HWSA	
oject No.: CL452.03	Client/Project: RANGB/ Hazardous Waste Storage Area	
AZWRAP Contractor: E-S Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: D Wright
rig Started: 1/24/90 (13:00 pm)	Drlg Ended: 1/24/90 (14:20 pm)	Borehole dia(s): 6"
rig Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
ogged by: G.O. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

th (ft)	Sample	Sample No.	Lab Anal. (Y/N)	Recovery (ft)	Headspace (ppm)	USCS	Lithologic Description	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3.5'	X	SS1	N	3.3	0	TO	CLAY medium brown, silty. Pebbles (10%) No odors.	2 4 5 6				
7.10'	X	SS2	N	4.0	0	TO	CLAY brown, sandy. No odors. Moist	3 4 8 7				
13.15'	X	SS3	N	13.6	0	TO	Till medium brown sandy gravel. Wet. No odors.	3 7 16 17				
15.17'	X	SS4	N	10.6	0	TO	Till brown sandy gravel. Wet. No odor.	7 15 24 21				
17.19'	X	SS5	N	Pid 0.d	0	TO	Till gray sandy gravel, to 18', wet. Fine well sorted gray sand @ 18.0' to 18.5'. Wet. Gray silty clay @ 18.5' to 19.0'.	7 11 11 18				
19.21'	X	SS6	N	9.3	0	TO	Till medium sandy gravel to 20'. Coarse sandy gravel from 20'-21'. No odors. Wet.	5 7 10 21				
							Till gray sandy gravel. No odors. Wet.	16 33 15 14				
							TD = 23'					

U = Thin wall tube R = Rock coring ____ Field G/C (Make/Mod.) ____

S = Split spoon (tube) O = Other ____ G/C Oper.: ____

C = Cuttings Notes: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-AB14	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWJA	
Project No.: CL452.03	Client/Project: ANGB/Hazardous Waste Storage Area	
HAZWRAP Contractor: E-C Inc.	Drlg Contractor: J Mathes & Assoc	Driller: D. Wright
Drlg Started: 1/25/90 (14:00 pm)	Drlg Ended: 1/25/90 (15:30 pm)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: G.D. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample	Sample No.	Lab Anal (Y/N)	Recovery (%)	Headspace (ppm)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
3-5'				70	0	Clay - brown, silty. No odors		1 2 7 9				
7-10				70	0	Clay - brown, silty. w/ pebbles (10%). No odors.		7 9 12 15				
15-15'				70	0	Clay - brown to dark gray, silty. Pebbles (<5%). No odors. Moist.		3 5 6 10				
17-19'				70	0	Gravel - brown, sandy. No odors. Wet.		3 4 9 10				
18.5-19'				70	0	Gravel - brown, sandy, to 18.5' Gray silty clay 18.5'-19'. No odors. Wet.		3 9 19 20				
22-22.5'				70	0	Gravel - brown, sandy. No odors. Wet.		5 18 23 28				
22.5-23'				70	0	Gravel - brown, sandy, to 22'. Fine well sorted brown sand 22-22.5'. Gray silty shale 22.5'-23.0'. Wet. No odors.		5 13 19 19				
24-25'				70	0	Gravel - brown, sandy, to 24'. Gray silty clay, to 25'. No odors.		6 10 14 15				

TO = 25'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RG-HW-AB15	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: D. Wright
Drlg Started: 1/25/90 (8:20 am)	Drlg Ended: 1/25/90 (11:30 am)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: G.C. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	Recovery (in)	Recovery (%)	USCS	Lithologic Description	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
0-5'	SS1	N	9.2	70	CL	CLAY brown, silty. Pebbles (10%). No odors.	2 3 4 3				
5-10'	SS2	N	5.0	70	CL	CLAY gray, silty. Small pebble debris (<5%). No odors. Moist.	1 1 3 2				
10-15'	SS3	N	7.6	70	CL	CLAY brown to gray, silty. No odors. Moist.	1 1 2 1				
15-17'	SS4	N	10.1	70	GW	Gravel - brown, sandy. No odors. Wet.	2 3 7 11				
17-19'	SS5	N	22.0	70	GW	Gravel - brown, sandy, to 18'. Gray silty clay from 18' to 19'. No odors. Wet.	5 7 9 14				
19-21'	SS6	N	10.9	70	GW	Gravel - brown, sandy, to 20'. Grading into larger sandy gravel @ 20' on. Wet.	7 19 27 33				
21-23'	SS7	N	13.5	70	SW	Sand-brown, fine well sorted. Wet. Coarse sandy gravel from 22-23'. Wet.	12 17 20 30				
23-25'	SS8	N	9.7	70	GW	Gravel - brown, sandy, w/ fine well sorted sand lenses interbedded. No odors. Wet.	7 9 12 15				
25-27'	SS9	N	5.2	70	GW	Gravel - gray, sandy, to 26'. Wet. Gray silty clay. Wet. 26'-27'. TD=27'	3 6 12 22				

U = Thin wall tube R = Rock coring ____ Field G/C (Make/Mod.) ____

S = Split spoon (tube) O = Other ____ G/C Oper.: ____

C = Cuttings Notes: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-MW4	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: CL450.03	Client/Project: RANGB/Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J Mathes & Assoc	Driller: G Mayle
Drlg Started: 1/29/90 (13:35 pm)	Drlg Ended: 1/29/90 (15:00 pm)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75TA		
Logged by: G.O. Carpenter	E-Log (Y/N) From _____ to _____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	PID (ppm)	Recovery (inches)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev. (ft)
1	3'-5'	Y/Y	0	70	Clay brown, silty. No odors.		3 4 6 7				
2	7'-10'	Y/Y	0	70	Clay brown, silty, to 9'9". Brown sandy clay from 9'9" to 10'. No odors. Moist.		2 3 7 10				
5	13'-15'	Y/Y	0	70	Sand brown silty, to 13.5'. Brown sandy clay / silty sand from 13.5' to 15'. No odors. Wet.		2 4 5 6				
0											
5											
0											
					TD = 16'						

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring _____
O = Other _____
Notes: _____
Field G/C (Make/Mod.) _____
G/C Oper.: _____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-MW5	Page 1 of 1
Installation: Richenbacker ANGB	Site: HW5A	
Project No.: CL450.03	Client/Project: RANGB/Hazardous Waste Storage Area	
HAZWRAP Contractor: E-J Inc	Drlg Contractor: J Mathes Assoc	Driller: D Carls
Drlg Started: 1/31/90 (9:30 a m)	Drlg Ended: 1/31/90 (10:30 a m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger / Split spoon / CME75TA		
Logged by: GD. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	Headspace (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
5	3-5' SS1	Y	9.4	70	CLAY brown, silty. W/ pebbles (10%). No odors.		1 3 4 4				
0	8-10' Y/SS2	Y	280	70	CLAY brown, sandy/silty Wet. No odors.		1 1 2 4				
5	13-15' Y/SS3	Y	2376	70	Sand gray Fine to medium well sorted. Wet. Strong odors. Interbedded sandy gray clay @ 14'-14.5'.		5 10 11 10				
10											
5											
0											
					TD = 16'						

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-MW6	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: CL452203	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-J Inc	Drlg Contractor: J Mathes & Assoc	Driller: G. Mayle
Drlg Started: 1/30/90 (9:45 a.m)	Drlg Ended: 1/30/90 (11:30 a.m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: G.D. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	Vapor (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth & Remarks	Elev. (ft)
5	3-5' Y553 Y/OL	Y	10.3	70	Clay brown, silty. W/ pebbles (10%). No odors.		4 5 8 10				
10	8-10' Y552 Y/OL	Y	5.7	70	Clay brown, silty. Trace pebbles (<5%). Moist. No odors.		1 3 6 8				
	13-15' Y553 Y/OL	Y	1304	70	Clay brown, silty. Moist. No odors.		4 3 6 7				
15			231	70	Clay gray, sandy, to 14'. Brown sandy gravel till from 14 to 15'. Wet. No odors.		2 4 11 12				
20											
25											
30											

TD = 16'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

BORING LOG

BORING/WELL NO.: RB-HW-MW7		Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J. Mathes & Assoc	Driller: G. Mayle
Drlg Started: 1/30/90 (13:00 pm)	Drlg Ended: 1/30/90 (14:10 pm)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75 TA		
Logged by: G.D. Carpenter	E-Log (Y/N) N From ____ to ____	Protection Level: D

Depth (ft)	Sample	Sample No.	Lab Anal. (Y/N) Micro Tip hnu (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
	3-5	551	43.8	0 / 70	Clay brown, silty. No odors		1 3 4 7				
	8-10'	Y/553	930	0 / 70	Clay brown, sandy. Hydrocarbon staining. Strong odors. Moist.		0 1 1 2				
	11-13'	Y/07	99.1	0 / 70	Clay gray, silty. Hydrocarbon staining. Moist. Odors.		0 1 1 2				
	13-15'	Y/553	155	0 / 70	Clay gray sandy, to 14.5'. Wet. Slight odor. Gray sandy gravel till. Wet. No odors.		1 1 1 2				

TD = 16'

U = Thin wall tube R = Rock coring ____ Field G/C (Make/Mod.) ____

S = Split spoon (tube) O = Other ____ G/C Oper.: ____

C = Cuttings Notes: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-MW8	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: ANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J Mathes & Assoc	Driller: G. Mayle
Drlg Started: 1/30/90 (15:00 p m)	Drlg Ended: 1/30/90 (16:20 p m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75TA		
Logged by: G.V. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Type	Lab Anal. (Y/N)	Micro Lip (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth B	Remarks	Elev (ft)
5	1-5'	SS	Y/SS1	13.0	0	70	Clay brown, silty. w/ pebbles (10%). No odors.		3 5 6 7				
10	5-10'	SS	Y/SS2	11.9	0	70	Clay brown to gray, sandy. w/ pebbles (<5%) and interbedded brown sands. No odors. Moist.		3 4 8 12				
15	13'-15'	SS	Y/SS3	16.9	0	70	Gravel - gray, sandy. Wet, no odors. Gray sandy clay from 14'-14.5', w/ pebbles (<5%).		3 4 14 17				
20							TD = 16'						

U = Thin wall tube
S = Split spoon(tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

REV. DATE: JAN 1989

BORING LOG	BORING/WELL NO.: RB-HW-MW9	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL450.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: J Mathes & Assoc	Driller: O Carls
Drlg Started: 2/9/90 (9:40 a m)	Drlg Ended: 2/9/90 (10:20 a m)	Borehole dia(s): 6"
Drlg Method/Rig Type: Hollow stem auger & Split spoon / CME 75TA		
Logged by: G.C. Carpenter	E-Log (Y/N) From ____ to ____	Protection Level: D

Depth (ft)	Sample No.	Sample Lab	Anal. (Y/N) Micro	Tip (ppm)	Hosp (ppm)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth & Remarks	Elev (ft)
5	3.5'-5.5'			9.0	0	70	Clay brown, silty. W/ pebbles (10%). No odors.		5, 7, 9, 8				
10	8'-10'			19.3	0	70	Clay brown, sandy. W/ pebbles (<5%). Moist No odors.		1, 2, 3, 4				
15	13'-15'			34.3	0	70	Sand brown, silty. W/ pebbles (<5%). Wet. No odors.		1, 2, 2, 3				
20													
25													
30													

TD = 16'

U = Thin wall tube
S = Split spoon (tube)
C = Cuttings
R = Rock coring ____
O = Other ____
Notes: ____
Field G/C (Make/Mod.) ____
G/C Oper.: ____

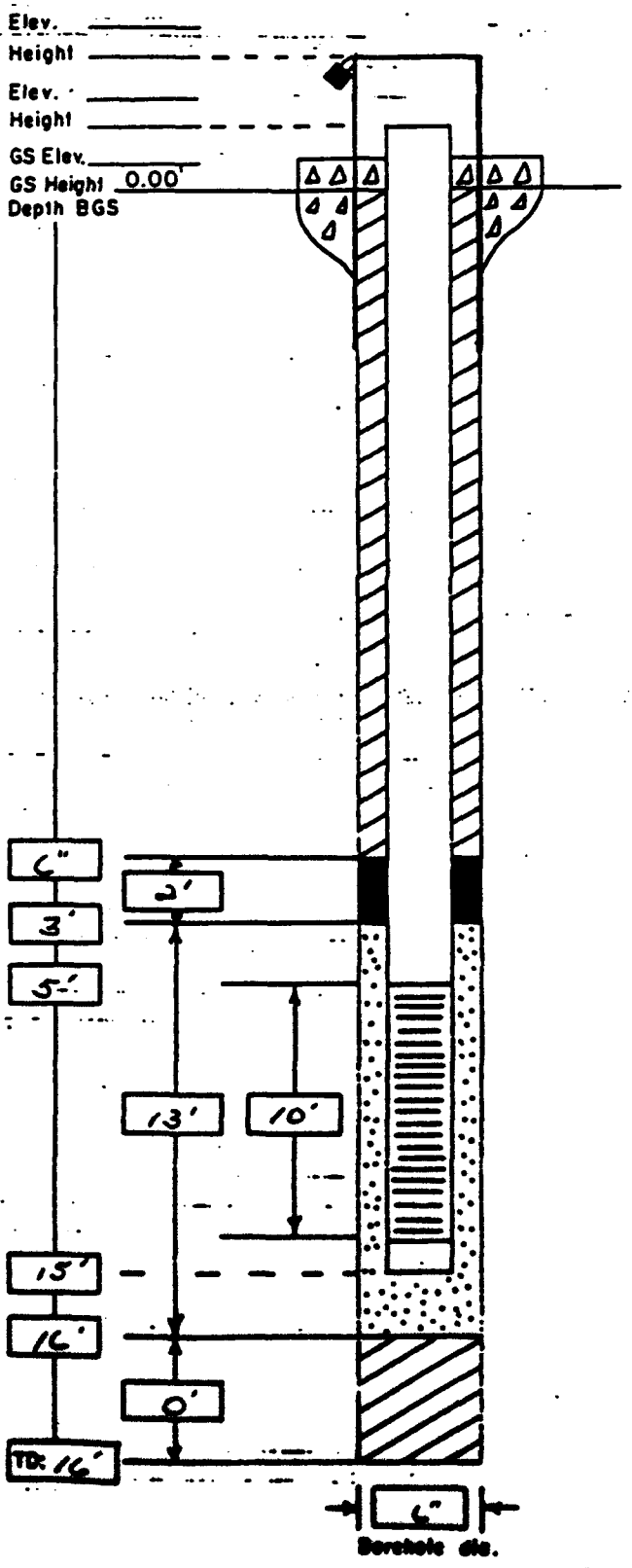
APPENDIX B

MONITORING WELL CONSTRUCTION AND DEVELOPMENT LOGS

REV. DATE: JAN. 1989

MONITORING WELL CONSTRUCTION LOG - Standard

WELL NO.: MW4	Installation: Rickenbacker ANGB	Site: HWSA
Project No.: CL450.63	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-5 Inc.	Drlg Contractor: John Mathes & Assoc.	
Comp. Start: 1/29/90 (13:35 m)	Comp. End: 1/29/90 (15:00 m)	
Built By: J. Mathes & Assoc. / GOC	Well Coord.: RB-HW-MW4	



PROTECTIVE CSG
Material/Type: Steel
Diameter: 4"
Depth BGS: 2.5' Weep Hole (Y/(N))

GUARD POSTS ((Y)/N)
No.: 3 Type: 1/4" Steel Pipe

SURFACE PAD
Composition & Size: Cement, 2'x2'x6"

RISER PIPE
Type: Sch. 40 PVC
Diameter: 2"
Total Length (TOC to TOS): 8'

GROUT
Composition & Proportions: 5% Bentonite
Tremied (Y/(N))
Interval BGS: 0.5'-1.0'

CENTRALIZERS (Y/(N))
Depth(s):

SEAL
Type: Bentonite Pellets
Source: J. Mathes & Assoc.
Setup/Hydration time: 15min. Vol. Fluid Added: 5 gal.
Tremied (Y/(N))

FILTER PACK
Type: Silica Sand
Amt Used: 200 lbs. (4 bags)
Tremied (Y/(N))
Source: J. Mathes & Assoc.
Gr. Size Dist.: 20x40

SCREEN
Type: Sch. 40 PVC
Diameter: 2"
Slot Size & Type: 0.01"
Interval BGS: 5'-15'

SUMP (Y/(N))
Interval BGS: Length:
Bottom Cap (Y/N)

BACKFILL PLUG None
Material:
Setup/Hydration time:
Tremied (Y/N)

REV. DATE: JAN 1989

WELL DEVELOPMENT LOG	WELL NO.: RB-HW-MW4	Page 1 of 1
Installation: Richardson ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-5 Inc.	Dev. Contractor: John Mathes & Assoc.	
Dev. Start: 2/2/90 (11 : 45 m)	Dev. End: 2/2/90 (12 : 00 m)	Csg Dia.:
Developed by: J. Mathes & Assoc. / GOC		Dev. Rig (Y N)

Dev. Method 3L8 Pressure / suction pump, with a 200 gpm pumping ability.

Equipment 3L8 suction pump & black neoprene hose (1")

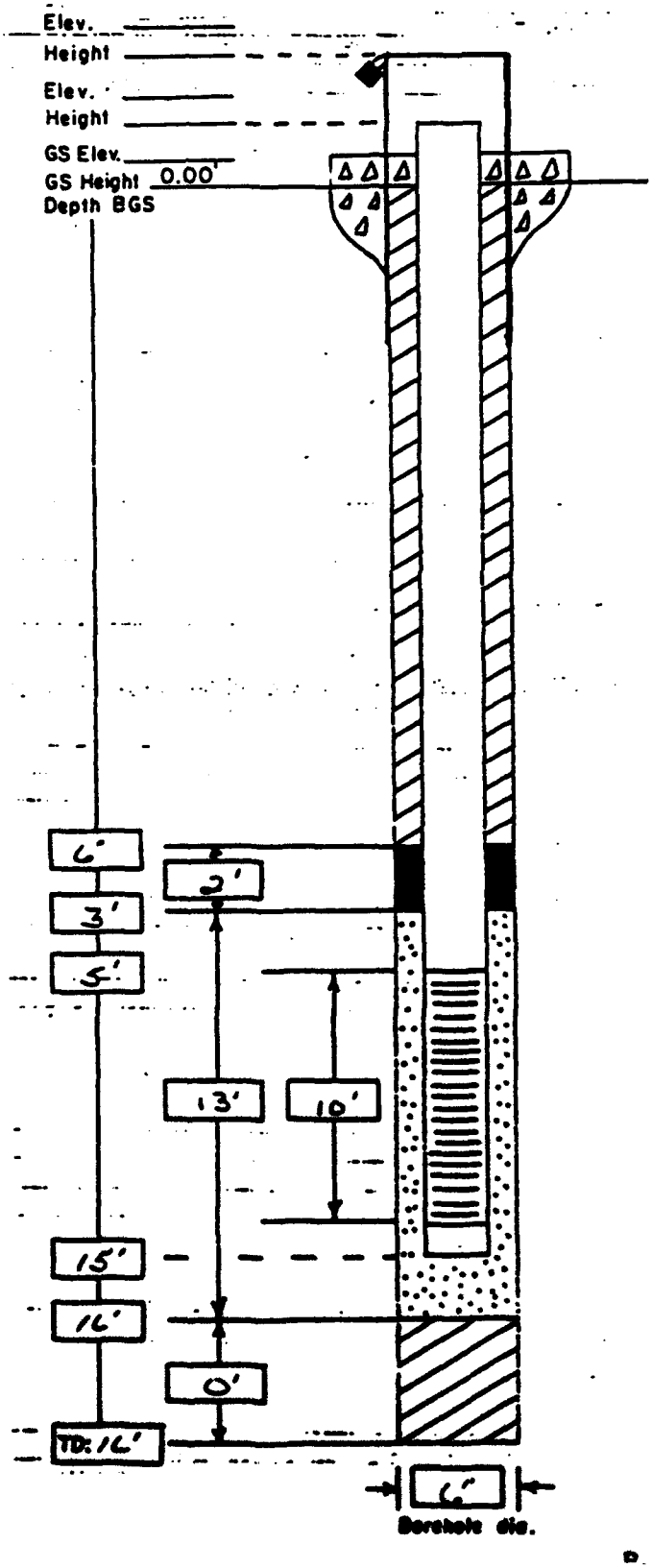
Pre-Dev. SWL 10.25' Maximum drawdown during pumping 7.66 ft at 0.67 gpm
Range and Average discharge rate 0.25 - 2.5 gpm / 0.67 gpm
Total quantity of material bailed —
Total quantity of water discharged by pumping 10 gal.
Disposition of discharge water Collected in 55 gal. secured drums located next to well.

Time	Volume Removed (gal)	Water Level ft.BTOC	Turbidity	Clarity/ Color	Temp. °C	pH	Conductivity	Remarks
11:45	2.5	17.90	high	brown	68	7.6	790	
11:50	5.0	17.90	low	light brown	63	8.0	800	
12:00	2.5	17.90	v. low	clear/ brown	61	7.8	790	Water becoming clearer
12:05	—	16.90	—	—	-	-	—	
13:00	—	12.10	-	-	-	-	-	
14:30	—	10.60	-	-	-	-	-	

REV. DATE: JAN 1989

MONITORING WELL CONSTRUCTION LOG - Standard

WELL NO.: MW5	Installation: Rickenbacker ANGB	Site: HWSA
Project No.: CL45J.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: ES Inc.	Drlg Contractor: John Mathes & Assoc.	
Comp. Start: 1/31/90 (9:30 m)	Comp. End: 1/31/90 (10:30 m)	
Built By: J. Mathes & Assoc.	Well Coord.: RB-HW-MW5	



PROTECTIVE CSG
Material/Type: Steel
Diameter: 4"
Depth BGS: 2.5' Weep Hole (Y/N)

GUARD POSTS (Y) N)
No. 3 Type: 1¼" Steel Pipe

SURFACE PAD
Composition & Size: Cement, 2' x 2' x 6"

RISER PIPE
Type: Sch. 40 PVC
Diameter: 2"
Total Length (TOC to TOS): 8'

GROUT
Composition & Proportions: 5% Bentonite

Tremied (Y/(N))
Interval BGS: 0.5' - 1.0'

CENTRALIZERS (Y/(N))
Depth(s):

SEAL
Type: Bentonite Pellets
Source: J. Mathes & Assoc
Setup/Hydration time: 10 min. Vol. Fluid Added: 5 gal
Tremied (Y/(N))

FILTER PACK
Type: Silica Sand
Amt Used: 200 lbs. (4 bags)
Tremied (Y/(N))
Source: J. Mathes & Assoc.
Gr. Size Dist.: 20 x 40

SCREEN
Type: Sch. 40 PVC
Diameter: 2"
Slot Size & Type: 0.01"
Interval BGS: 5' - 15'

SUMP (Y/(N))
Interval BGS: Length:
Bottom Cap (Y/N)

BACKFILL PLUG None
Material:
Setup/Hydration time:
Tremied (Y/N)

REV. DATE: JAN 1989

WELL DEVELOPMENT LOG

WELL NO.: RB-HW-MW5 | Page 1 of 1

Installation: Richardson ANGB | Site: HWSA

Project No.: CL462.03 | Client/Project: RANGB/ Hazardous Waste Storage Area

HAZWRAP Contractor: E-S Inc. | Dev. Contractor: John Mathes & Assoc.

Dev. Start: 2/2/90 (11 : 15 m) | Dev. End: 2/2/90 (11 : 25 m) | Csg Dia.:

Developed by: J. Mathes & Assoc. / GOC | Dev. Rig (Y/N)

v. Method 3" Pressure / suction pump, with a 200 gpm pumping ability.

uipment 3" suction pump & black neoprene hose (1")

e-Dev. SWL 12.60 Maximum drawdown during pumping 5.00 ft at 0.70 gpm

inge and Average discharge rate 0.25 - 5 gpm / 0.7 gpm

tal quantity of material boiled —

tal quantity of water discharged by pumping 7.5 gal.

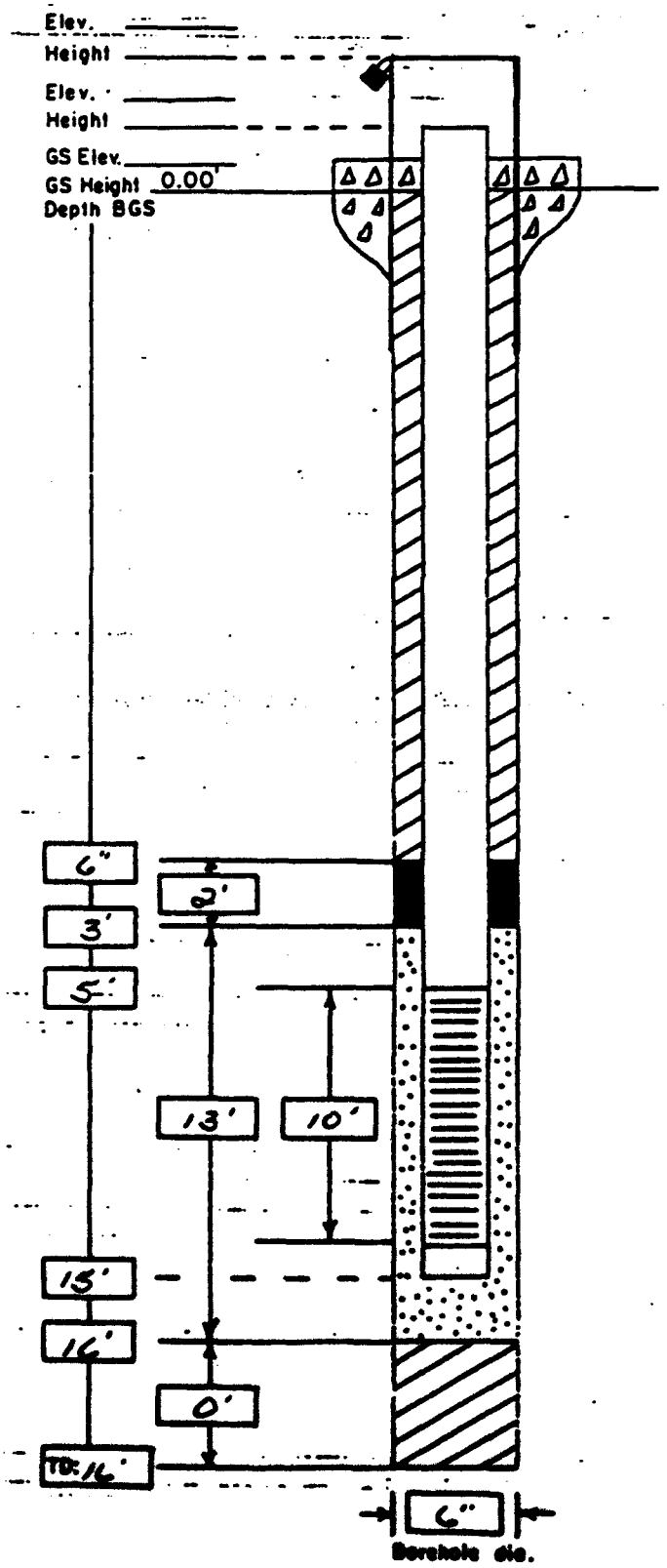
sposition of discharge water Collected in 55 gal. secured drum located next to well.

Time	Volume Removed (gal)	Water Level ft.BTOC	Turbidity	Clarity/ Color	Temp. °C	pH	Conductivity	Remarks
11:15	5	17.60	N/A	Amber	63	8.2	630	Strong odor, product
11:25	2.5	17.60	N/A	Amber	61	8.1	600	" " "
11:30	-	15.00	-	-	-	-	-	
12:05	-	13.50	-	-	-	-	-	
13:00	-	12.90	-	-	-	-	-	
14:30	-	12.80	-	-	-	-	-	

REV. DATE: JAN 1989

MONITORING WELL CONSTRUCTION LOG - Standard

WELL NO.: MW6	Installation: Rickenbacker ANGB	Site: HWSA
Project No.: CL452203	Client/Project: ANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-5 Inc.	Drlg Contractor: John Mathes & Assoc.	
Comp. Start: 1/30/90 (9:45 m)	Comp. End: 1/30/90 (11:30 m)	
Built By: J. Mathes & Assoc	Well Coord.: RB-HW-MW6	



PROTECTIVE CSG
Material/Type: Steel
Diameter: 4"
Depth BGS: 2.5' Weep Hole (Y/N)

GUARD POSTS (Y/N)
No. 3 Type: 1/4" Steel Pipe

SURFACE PAD
Composition & Size: Cement, 2'x2'x6"

RISER PIPE
Type: Sch. 40 PVC
Diameter: 2"
Total Length (TOC to TOS): 8'

GROUT
Composition & Proportions: 5% Bentonite
Tremied (Y/N)
Interval BGS: 0.5' - 1.0'

CENTRALIZERS (Y/N)
Depth(s):

SEAL
Type: Bentonite Pellets
Source: J. Mathes & Assoc.
Setup/Hydration time: 10 min. Vol. Fluid Added: 5 gal
Tremied (Y/N)

FILTER PACK
Type: Silica Sand
Amt Used: 800 lbs (4 bags)
Tremied (Y/N)
Source: J. Mathes & Assoc.
Gr. Size Dist.: #20 - 40

SCREEN
Type: Sch. 40 PVC
Diameter: 2"
Slot Size & Type: 0.01"
Interval BGS: 5' - 15'

SUMP (Y/N)
Interval BGS: Length:
Bottom Cap (Y/N)

BACKFILL PLUG
Material: None
Setup/Hydration time:
Tremied (Y/N)

REV. DATE: JAN 1989

WELL DEVELOPMENT LOG

WELL NO.: RB-HW-MW6 | Page 1 of 1

Installation: Rickenbacker ANGB | Site: HWSA

Project No.: CL452.03 | Client/Project: RANGB / Hazardous Waste Storage Area

HAZWRAP Contractor: E-5 Inc. | Dev. Contractor: John Mathes & Assoc.

Dev. Start: 2/2/90 (12:20 m) | Dev. End: 2/2/90 (12:45 m) | Csg Dia.:

Developed by: J Mathes & Assoc / GOC | Dev. Rig (Y/N)

Dev. Method 3" Pressure / suction pump, with a 200 gpm pumping ability.

Equipment 3" suction pump & black neoprene hose (1")

Pre-Dev. SWL 11.05' Maximum drawdown during pumping 6.40 ft at 0.30 gpm

Range and Average discharge rate 0.25 - 2.5 gpm / 0.3 gpm

Total quantity of material boiled —

Total quantity of water discharged by pumping 7.5 gal

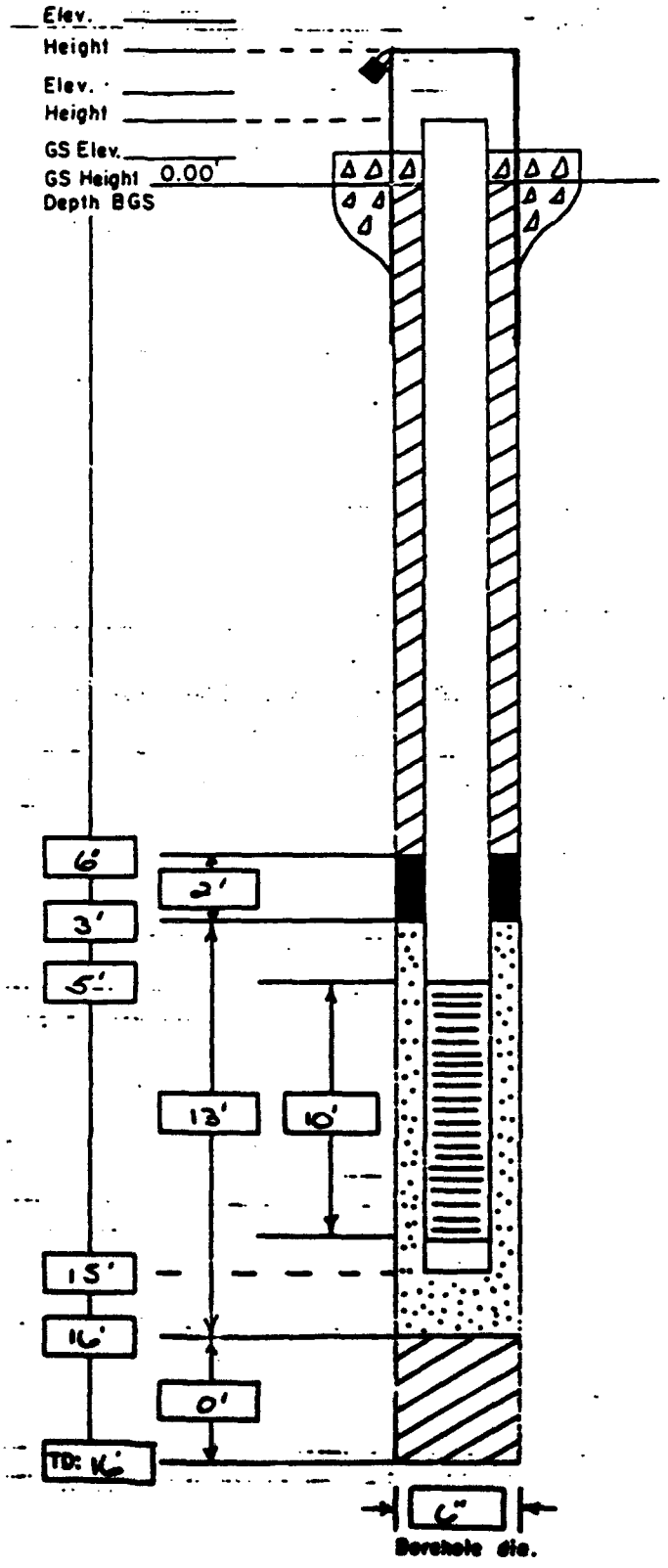
Disposition of discharge water Collected in 55 gal secure drum located next to well.

Time	Volume Removed (gal)	Water Level ft.BTOC	Turbidity	Clarity/ Color	Temp. °C	pH	Conductivity	Remarks
12:20	2.5	17.45	low	brown	60	7.7	800	allowed to recharge
12:35	2.5	17.45	low	light brown	60	7.9	790	" " "
12:45	2.5	17.45	v. low	brownish clearing	60	7.8	750	" " "
12:50	-	16.08	-	-	-	-	-	
13:00	-	-	-	-	-	-	-	
13:30	-	12:35	-	-	-	-	-	
14:20	-	12.20	-	-	-	-	-	

REV. DATE: JAN 1989

MONITORING WELL CONSTRUCTION LOG - Standard

WELL NO.: MW7	Installation: Rickenbacker ANGB	Site: HWSA
Project No.: AL455.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: John Mathes & Assoc.	
Comp. Start: 1/30/90 (13:00 m)	Comp. End: 1/30/90 (14:10 m)	
Built By: J. Mathes & Assoc.	Well Coord.: RA-HW-MW7	



PROTECTIVE CSG
Material/Type: Steel
Diameter: 4"
Depth BGS: 2.5' Weep Hole (Y/N)

GUARD POSTS (Y/N)
No. 3 Type: 1/4" Steel Pipe

SURFACE PAD
Composition & Size: Cement, 2'x2'x6"

RISER PIPE
Type: Sch. 40 PVC
Diameter: 2"
Total Length (TOC to TOS): 3'

GROUT
Composition & Proportions: 5% Bentonite
Tremied (Y/N)
Interval BGS: 0.5'-1.0'

CENTRALIZERS (Y/N)
Depth(s):

SEAL
Type: Bentonite Pellets
Source: J. Mathes & Assoc
Setup/Hydration time: 10 min. Vol. Fluid Added: 5 gal.
Tremied (Y/N)

FILTER PACK
Type: Silica Sand
Amt Used: 200 lbs (4 bags)
Tremied (Y/N)
Source: J. Mathes & Assoc
Gr. Size Dist.: #20 x 40

SCREEN
Type: Sch 40 PVC
Diameter: 2"
Slot Size & Type: 0.01"
Interval BGS: 5'-15'

SUMP (Y/N)
Interval BGS: Length:
Bottom Cap (Y/N)

BACKFILL PLUG
Material: None
Setup/Hydration time:
Tremied (Y/N)

REV. DATE: JAN 1989

WELL DEVELOPMENT LOG	WELL NO.: RB-HW-MW7	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HW5A	
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-J Inc.	Dev. Contractor: John Mathes & Assoc.	
Dev. Start: 2/2/90 (10 : 50 m)	Dev. End: 2/2/90 (11 : 05 m)	Csg Dia.:
Developed by: J. Mathes & Assoc. / GOC		Dev. Rig (Y N)

Dev. Method 3L8 Pressure / suction pump, with a 200 gpm pumping ability

Equipment 3L8 suction pump & black neoprene hose (1")

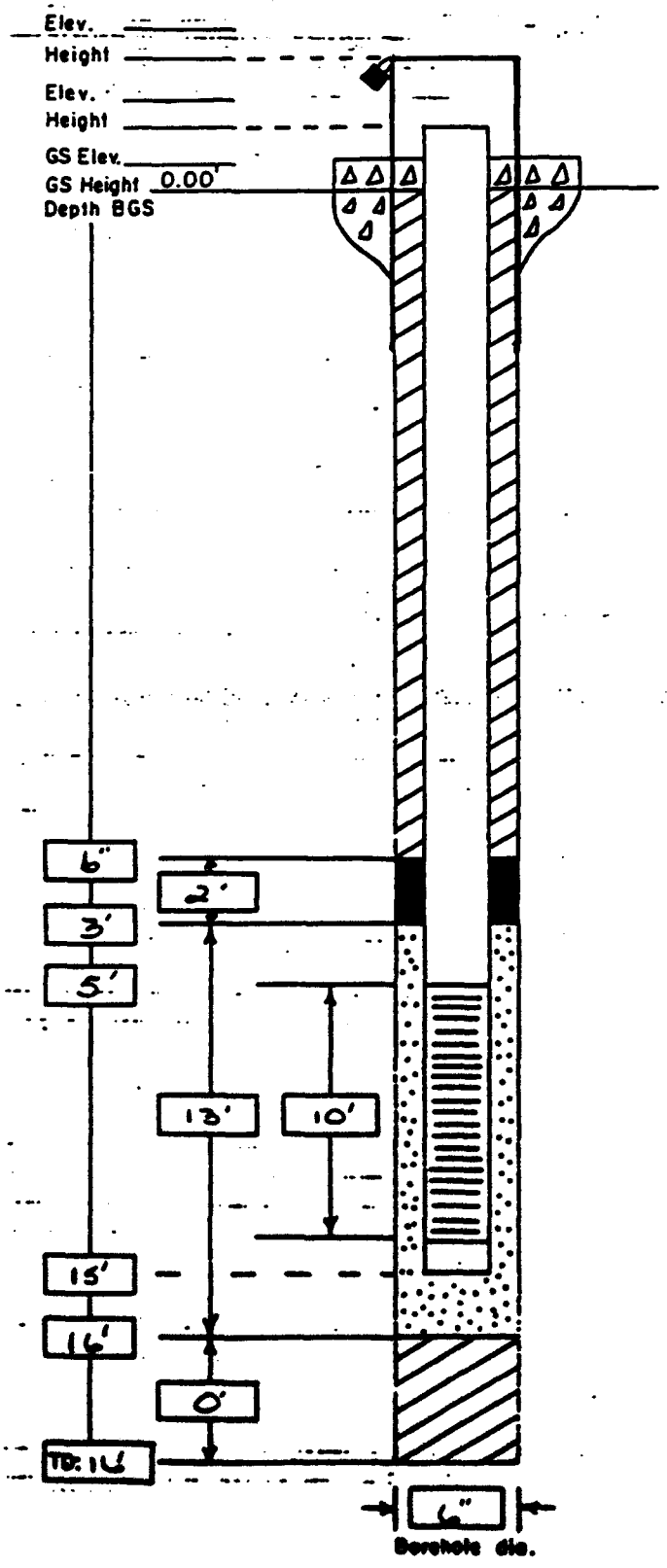
Pre-Dev. SWL 12.45' Maximum drawdown during pumping 6.70 ft at 1.5 gpm
Range and Average discharge rate 1.0-5.0 gpm / 1.5 gpm
Total quantity of material bailed —
Total quantity of water discharged by pumping 15 gal.
Disposition of discharge water Collected in 55 gal. secure drum located next to well

Time	Volume Removed (gal)	Water Level ft.BTOC	Turbidity	Clarity/ Color	Temp. °C	pH	Conductivity	Remarks
10:50	5	19.15	low	brown	62	7.4	740	
10:55	5	19.15	v. low	light brown	59	8.0	740	Clearing
11:00	5	19.15	—	clear	58	8.0	760	Clear
11:05	-	15.00	-	-	-	-	-	
12:05	-	12.65	-	-	-	-	-	
13:00	-	12.55	-	--	-	-	-	

REV. DATE: JAN 1989

MONITORING WELL CONSTRUCTION LOG - Standard

WELL NO.: MW8	Installation: Rickenbacker ANGB	Site: HWSA
Project No.: CL452.03	Client/Project: RANGG/ Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: John Mathes & Assoc	
Comp. Start: 1/30/90 (15:00 m)	Comp. End: 1/30/90 (16:30 m)	
Built By: J. Mathes & Assoc.	Well Coord.: RB-HW-MW8	



PROTECTIVE CSG
Material/Type: Steel
Diameter: 4"
Depth BGS: 2.5' Weep Hole (Y/N)

GUARD POSTS (Y/N)
No.: 3 Type: 1/4" Steel Pipe

SURFACE PAD
Composition & Size: Cement, 2' x 2' x 6"

RISER PIPE
Type: Sch. 40 PVC
Diameter: 2"
Total Length (TOC to TOS): 8'

GROUT
Composition & Proportions: 5% Bentonite
Tremied (Y/N)
Interval BGS: 0.5' - 1.0'

CENTRALIZERS (Y/N)
Depth(s):

SEAL
Type: Bentonite Pellets
Source: J. Mathes & Assoc.
Setup/Hydration time: 10 min. Vol. Fluid Added:
Tremied (Y/N)

FILTER PACK
Type: Silica Sand
Amt Used: 150 lbs. (3 bags)
Tremied (Y/N)
Source: J. Mathes & Assoc.
Gr. Size Dist.: #20 - 40

SCREEN
Type: Sch. 40 PVC
Diameter: 2"
Slot Size & Type: 0.01"
Interval BGS: 5' - 15'

SUMP (Y/N)
Interval BGS: Length:
Bottom Cap (Y/N)

BACKFILL PLUG
Material: None
Setup/Hydration time:
Tremied (Y/N)

REV. DATE: JAN 1989

WELL DEVELOPMENT LOG	WELL NO.: RB-HW-MW8	Page 1 of 1
Installation: Rickenbacker ANGB	Site: HWSA	
Project No.: e6452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Dev. Contractor: John Mathes & Assoc.	
Dev. Start: 2/2/90 (9: 50 m)	Dev. End: 2/2/90 (10 : 25 m)	Csg Dia.:
Developed by: J. Mathes & Assoc. / GOC		Dev. Rig (Y)/ N)

Dev. Method 3L8 Pressure / suction pump, with a 200 gpm pumping ability.

Equipment 3L8 suction pump & black neoprene hose (1")

Pre-Dev. SWL 3.40' Maximum drawdown during pumping 9.80 ft at 0.43 gpm

Range and Average discharge rate 0.33 - 5.0 gpm / 0.43 gpm

Total quantity of material bailed —

Total quantity of water discharged by pumping 15 gal.

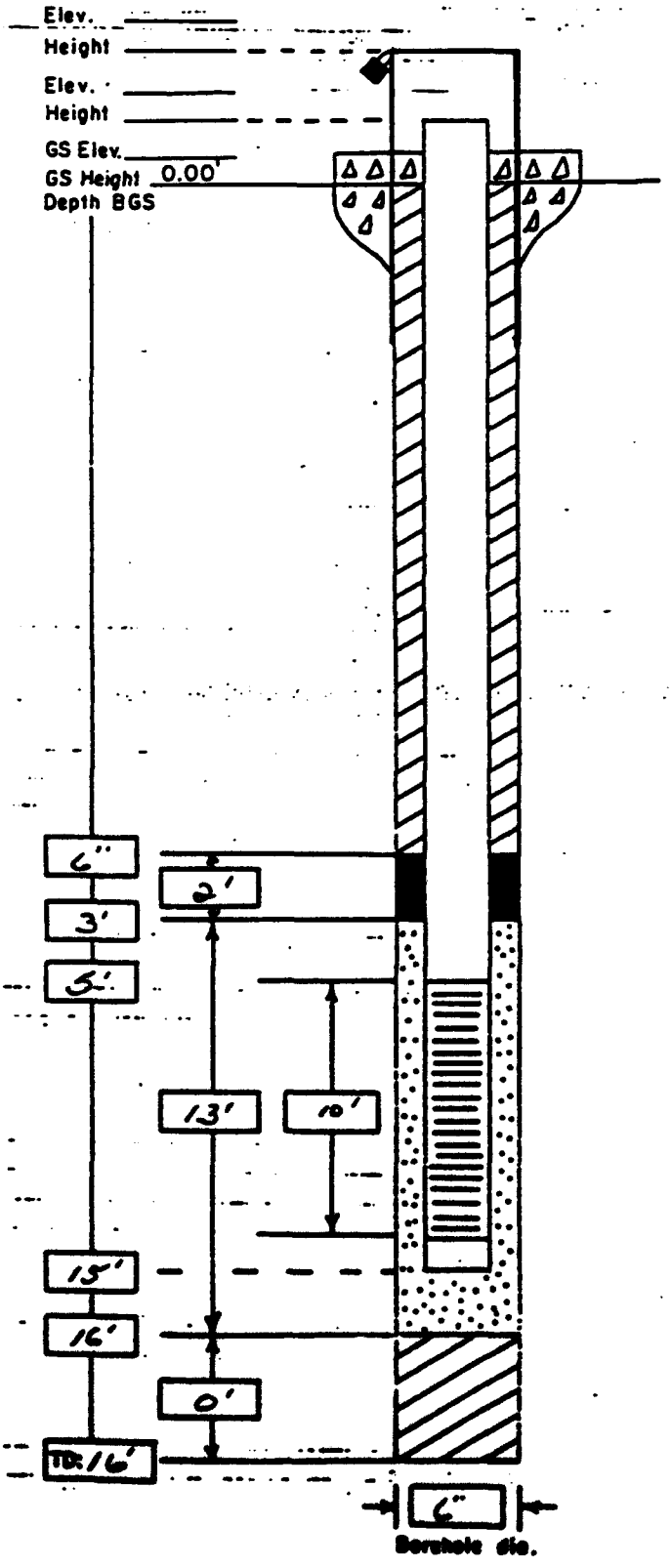
Disposition of discharge water Collected in 55 gal. secure drum located next to well

Time	Volume Removed (gal)	Water Level ft.BTOC	Turbidity	Clarity/ Color	Temp. °C	pH	Conductivity	Remarks
9:50	5	18.20	low	brown	50	7.8	710	
10:10	5	18.20	v. low	light brown	51	8.1	620	
10:25	5	18.20	v. low	clearing brown	57	7.9	620	
10:35	-	14.35	-	-	-	-	-	
11:00	-	11.60	-	-	-	-	-	
12:05	-	10.73	-	-	-	-	-	
13:00	-	10.55	-	-	-	-	-	
14:30	-	10.53	-	-	-	-	-	

REV. DATE: JAN 1989

MONITORING WELL CONSTRUCTION LOG - Standard

WELL NO.: MW 9	Installation: Rickenbacker ANGB	Site: HWSA
Project No.: 114502	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-S Inc.	Drlg Contractor: John Mathes & Assoc.	
Comp. Start: 2/9/90 (9: 40 m)	Comp. End: 2/9/90 (11 : 00 m)	
Built By: J. Mathes & Assoc.	Well Coord.: RB-HW-MW9	



PROTECTIVE CSG
Material/Type: Steel
Diameter: 4"
Depth BGS: 2.5' Weep Hole (Y/N)

GUARD POSTS (Y) N
No. 3 Type: 1/4" Steel Pipe

SURFACE PAD
Composition & Size: Cement, 2'x2'x6"

RISER PIPE
Type: Sch. 40 PVC
Diameter: 2"
Total Length (TOC to TOS): 8'

GROUT
Composition & Proportions: 5% Bentonite

Tremied (Y/N)
Interval BGS: 0.5' - 1.0'

CENTRALIZERS (Y/N)
Depth(s):

SEAL
Type: Bentonite Pellets
Source: J. Mathes & Assoc.
Setup/Hydration time: 10 min. Vol. Fluid Added: 5 gal
Tremied (Y/N)

FILTER PACK
Type: Silica Sand
Amt Used: 200 lbs (4 bags
Tremied (Y/N)
Source: J. Mathes & Assoc
Gr. Size Dist.: 20 x 40

SCREEN
Type: Sch. 40 PVC
Diameter: 2"
Slot Size & Type: 0.01"
Interval BGS: 5' - 15'

SUMP (Y/N)
Interval BGS: Length:
Bottom Cap (Y/N)

BACKFILL PLUG
Material: None
Setup/Hydration time:
Tremied (Y/N)

REV. DATE: JAN 1989

WELL DEVELOPMENT LOG	WELL NO.: RB-HW-MW9	Page 1 of 1
Installation: Rickenbacker ANGB		Site: HWSA
Project No.: CL452.03	Client/Project: RANGB / Hazardous Waste Storage Area	
HAZWRAP Contractor: E-J Inc.	Dev. Contractor: John Mathes & Assoc.	
Dev. Start: 2/9/90 (13:00 m)	Dev. End: 2/9/90 (13:20 m)	Csg Dia.:
Developed by: J. Mathes & Assoc. / GOC		Dev. Rig (Y/N)

Dev. Method Manual 2" Teflon bailer

Equipment 2" teflon bailer with

Pre-Dev. SWL 17.05' Maximum drawdown during pumping 1.15 ft at 0.10 gpm
Range and Average discharge rate 0.1 - 0.25gpm / 0.1 gpm
Total quantity of material bailed 2 gal.
Total quantity of water discharged by pumping —
Disposition of discharge water Collected in 55 gal. secure drum located next to well

Time	Volume Removed (gal)	Water Level ft.BTOC	Turbidity	Clarity/ Color	Temp. °C	pH	Conductivity	Remarks
13:00	0.25	18.15	v. low	Clear	54	7.2	840	
13:05	1.0	18.15	-	"	53	7.3	950	
13:20	2.0	18.15	-	"	52	7.5	910	
13:25	—	17.90		-	-	—	-	
14:05	—	17.63		-	—	—	-	

APPENDIX C

HYDRAULIC CONDUCTIVITY TEST

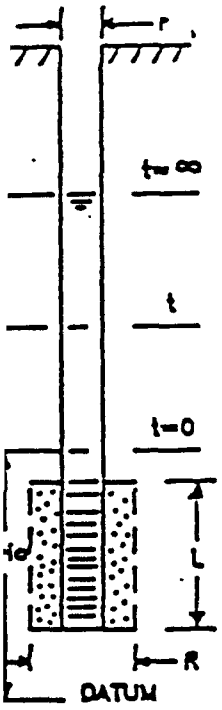
FIELD LOGS

IN-SITU PERMEABILITY TEST
FIELD LOG

OJECT CL452.03 LOCATION RANGE-HWSA

LL NUMBER MW4 ELEVATION

TE 15 FEB 1990



STATIC HEAD (H) 7.02'

PIPE RADIUS (r) 0.083'

SCREEN RADIUS (R) 0.50'

SCREEN LENGTH (L) 10.0'

INITIAL HEAD (Ho) 5.02'

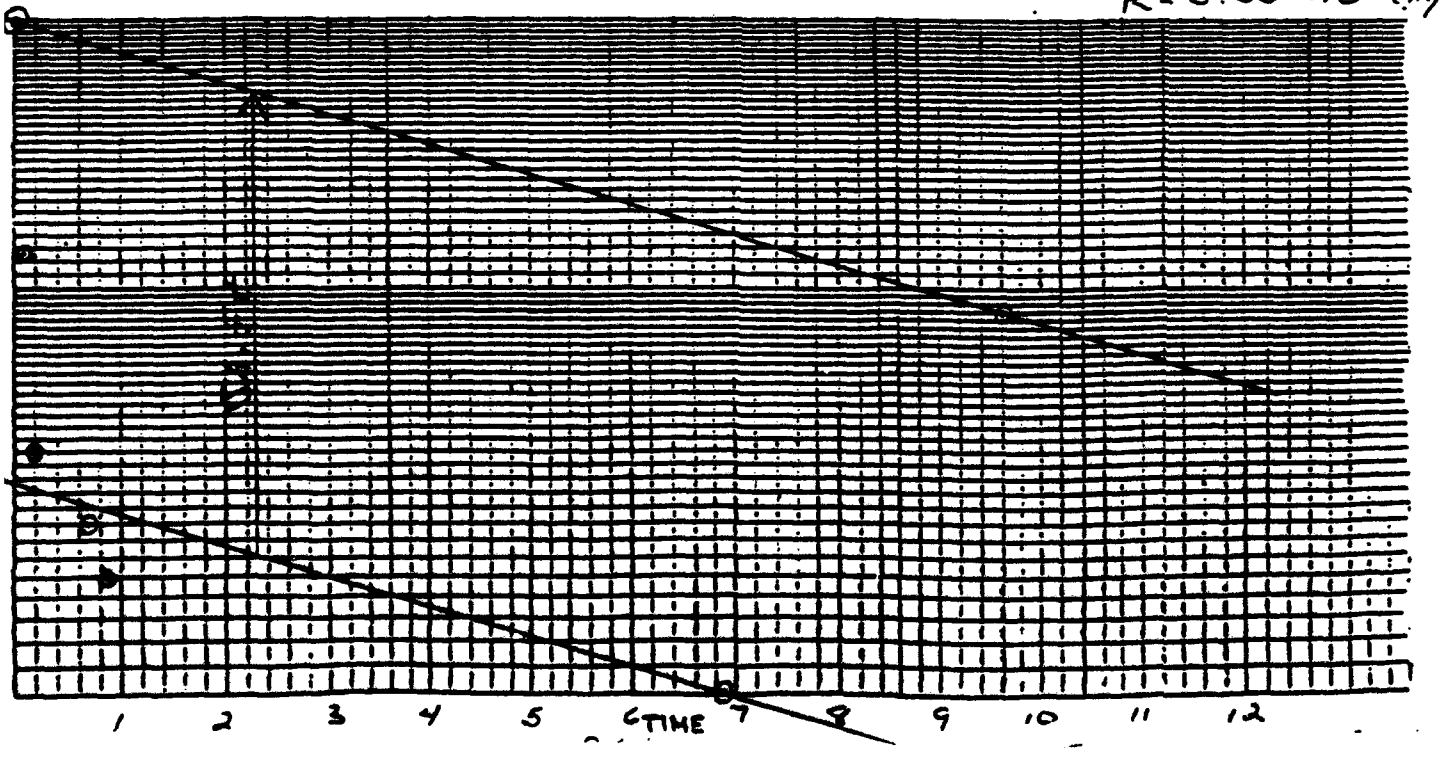
HYDRAULIC CONDUCTIVITY :

$$K=\frac{r^2 \ln(L/R)}{2LTo}$$

$$K=\frac{(0.083')^2 \ln(10.0'/0.50')}{2(10.0')\ 9.60\ min}=\frac{0.0075\ ft^2(2.996)}{192.0\ ft\ min}=1.09\times10^{-4}\ ft/min$$

$K=5.55\times10^{-5}$ cm/

TIME	WATER DEPTH		h	H-h / H-Ho
0.00	13.18		5.02	1.00
0.05	12.09		6.11	0.64
0.10	11.52		6.68	0.45
0.20	10.86		7.34	0.23
0.67	10.73		7.47	0.18
1.92	10.63		7.57	0.15
6.92	10.51		7.69	0.11
19.92	10.38		7.82	0.07
39.92	10.28		7.92	0.03
59.92	10.23		7.97	0.02

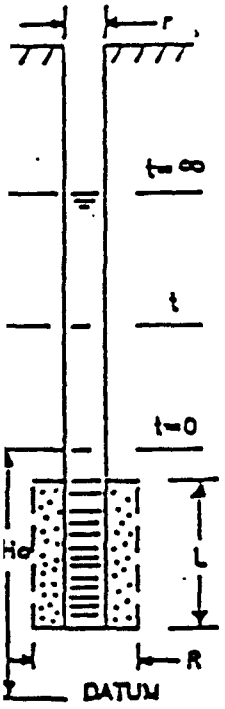


IN-SITU PERMEABILITY TEST
FIELD LOG

OJECT C'C4502.03 LOCATION RANGB-HWSA

LL NUMBER MW6 ELEVATION

TE 16 FEB 1990



STATIC HEAD (H) 7.30'

PIPE RADIUS (r) 0.083'

SCREEN RADIUS (R) 0.50'

SCREEN LENGTH (L) 10.0'

INITIAL HEAD (Ho) 3.61'

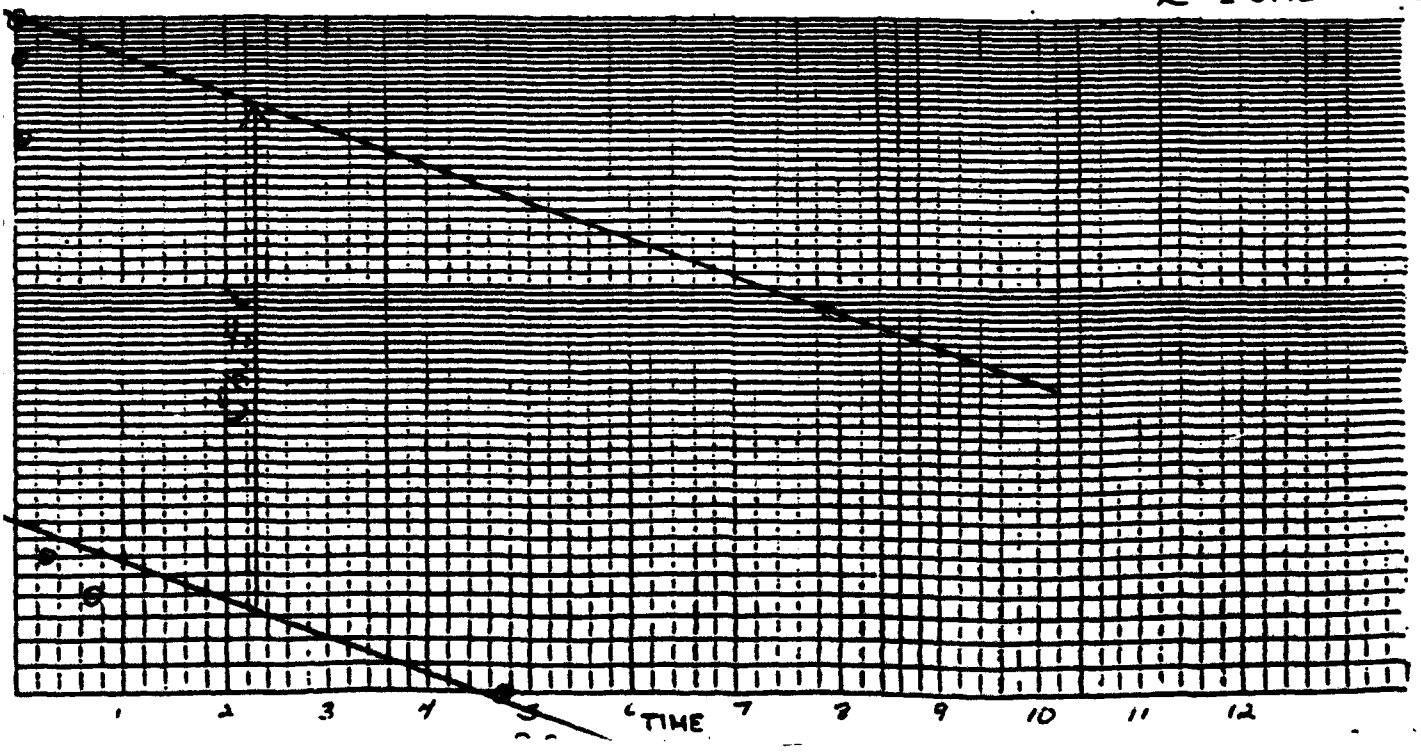
HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LTo}$$

$$K = \frac{(0.083')^2 \ln(10.0'/0.50')}{2(10.0')\ 7.9\ min} = \frac{0.0075 t^2 (2.996)}{158.0\ ft\ min} = \frac{0.021}{158.0} = 1.33 \times 10^{-4}\ ft/min$$

$$K = 6.75 \times 10^{-5}\ cm$$

TIME	WATER DEPTH	t	h	H-h / H-Ho
0.00	14.14		3.61	1.00
0.05	13.65		4.10	0.87
0.07	12.93		4.82	0.67
0.37	11.03		6.72	0.16
0.78	10.97		6.78	0.14
4.78	10.79		6.96	0.09
9.78	10.60		7.09	0.06
29.78	10.55		7.20	0.03

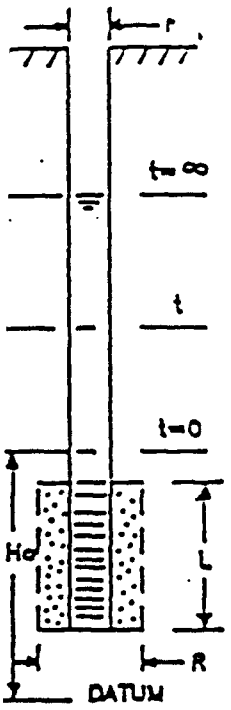


IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT CL452.03 LOCATION RANGB - HWSA

WELL NUMBER MW7 ELEVATION

DATE 15 Feb 1990



STATIC HEAD (H) 7.30'

PIPE RADIUS (r) 0.083'

SCREEN RADIUS (R) 0.50'

SCREEN LENGTH (L) 10.0'

INITIAL HEAD (Ho) 4.77'

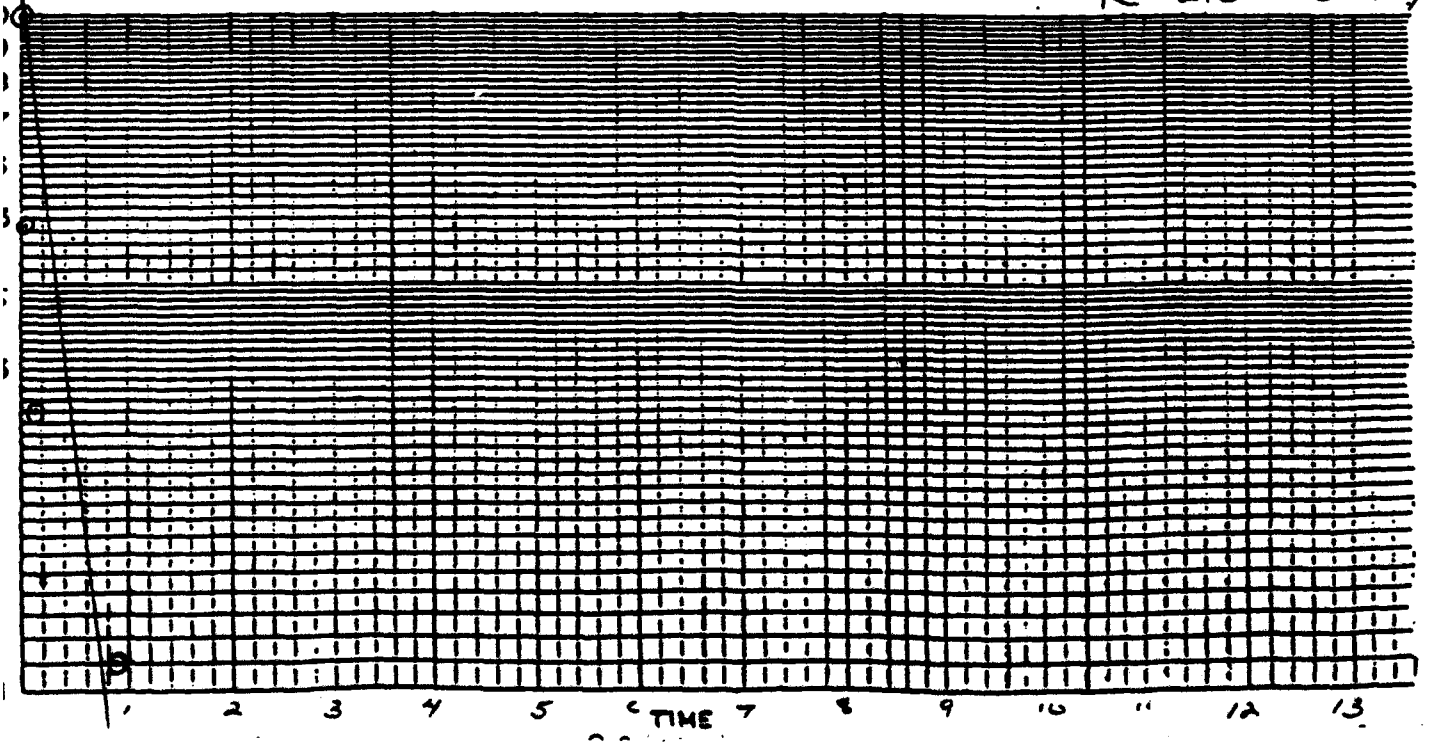
HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

TIME	WATER DEPTH	h	H−h / H−Ho
0.00	14.68	4.77	1.00
0.07	13.39	6.06	0.49
0.15	12.81	6.64	0.26
0.93	12.43	7.02	0.11
4.93	12.21	7.24	0.02
9.93	12.17	7.28	0.01
29.90	12.13	7.32	0.01

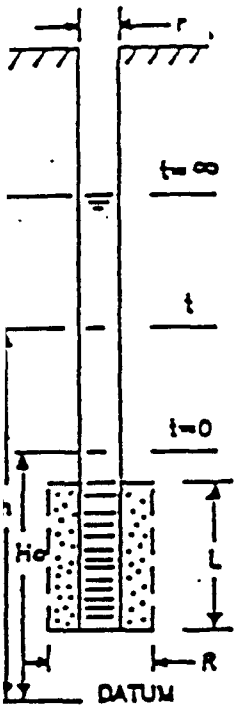
$$K = \frac{(0.083')^2 \ln(10.0'/0.50')}{2(10.0')\ 0.35\ min} = \frac{0.007ft^2(2.996)}{7.005\ min} = 3.00 \times 10^{-3}\ ft/min$$

$K = 2.00 \times 10^{-3}$ cm/s



IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT 24452.03 LOCATION RANGE-HWSA
WELL NUMBER MW2 ELEVATION
DATE 15 FEB 1990



STATIC HEAD (H) 7.60'
PIPE RADIUS (r) 0.083'
SCREEN RADIUS (R) 0.50'
SCREEN LENGTH (L) 10.0'
INITIAL HEAD (Ho) 4.18'

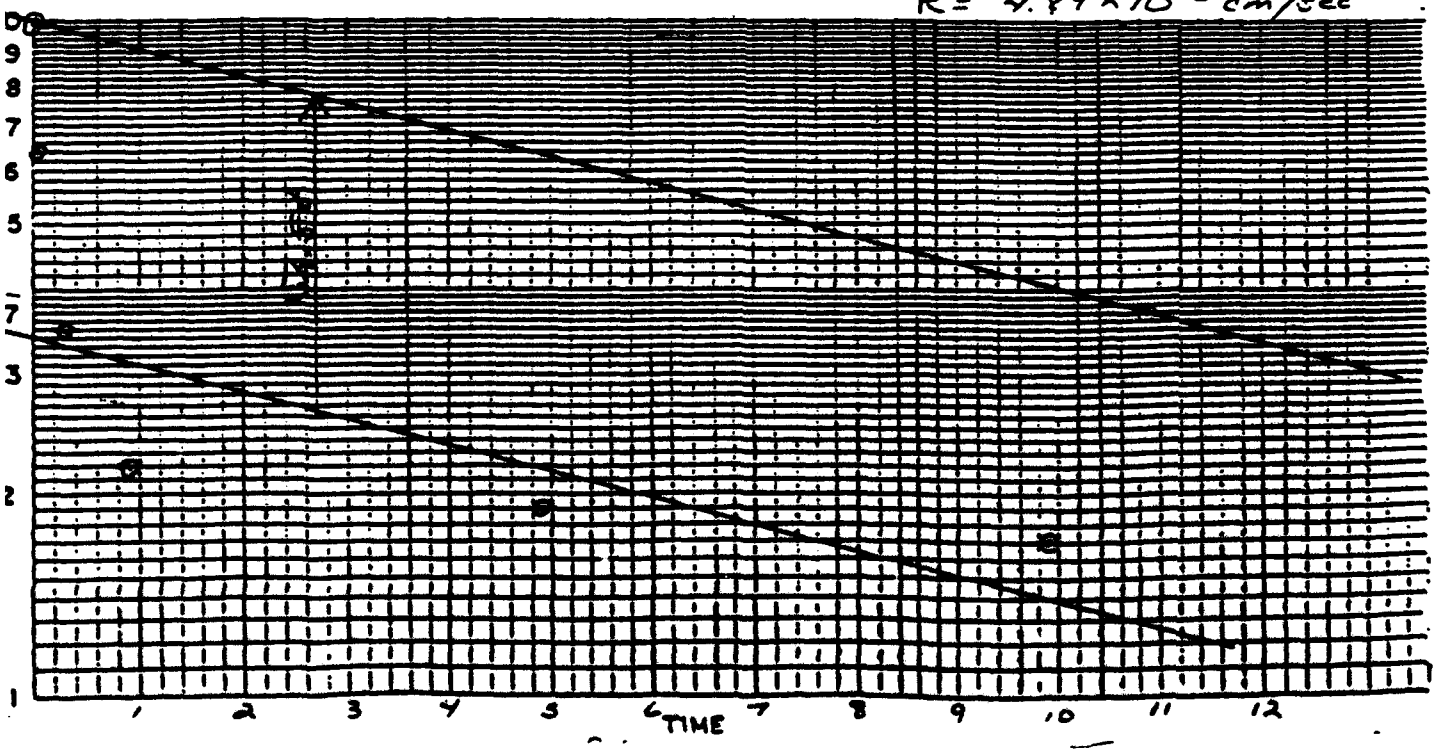
HYDRAULIC CONDUCTIVITY :

$$K=\frac{r^2 \ln(L/R)}{2LT_o}$$

$$K=\frac{(0.083')^2 \ln(10.0'/0.50')}{2(10.0')\ 10.90\ min}=\frac{.0078t^2(2.996)}{218.05t\ min}=\frac{0.0218t^2}{219.05t\ min}=9.62\times10^{-5}$$

$K = 4.89 \times 10^{-5}$ cm/sec

TIME	WATER DEPTH	h	H-h / H-Ho
0.00	14.32	4.18	1.00
0.08	12.10	5.40	0.64
0.32	12.09	6.41	0.35
0.90	11.71	6.79	0.24
4.90	11.55	6.95	0.19
9.90	11.47	7.03	0.17
29.90	11.30	7.20	0.12



APPENDIX D

QUALITY ASSURANCE REPORT

APPENDIX D

QUALITY ASSURANCE REPORT

This appendix presents a summary and review of quality assurance and quality control results for the laboratory analysis of water and soil samples collected as part of the Pre-Closure Sampling of the Hazardous Waste Storage Area during 1990 at Rickenbacker Air National Guard Base (ANGB) in Columbus, Ohio. The analyses were performed by Engineering-Science Berkeley Laboratory (ESBL).

The results from ESBL are divided into several data packages. Each data package is comprised of one or more work orders and includes all the required quality control documentation. Each package was validated by reviewing holding times, GC/MS tuning, initial and continuing calibration, blank/spike control samples, surrogate results, method blanks, matrix spike/spike duplicates and field quality control sample results. If the criteria were not met in any of these categories, action was taken as specified by the HAZWRAP validation guidelines. Specific problems will be discussed in this section along with the action that was taken. Validation notes are included with this Appendix. Laboratory deliverables will be submitted under separate cover upon request.

The analytical results of the environmental and quality control (QC) samples were evaluated to assess the representativeness, precision and accuracy, comparability and completeness of the data.

Representativeness was evaluated from the analytical results of the trip blanks, field blanks, rinseate blanks, method blanks and field duplicate samples. Analytical results of the blanks are summarized in Tables D-3 and D-4. Comparison of the analytical results from duplicate samples are summarized in Tables D-5 and D-6.

Precision and accuracy were evaluated by reviewing the laboratory matrix spike sample (MS), matrix spike duplicate sample (MSD) and the surrogate spike sample. This information along with the Case Narratives which discuss specific QC problems, is included with the data deliverables.

Comparability qualitatively expresses the confidence with which one data set can be compared with another. Analytical methods were used for this investigation which are

documented standard methods. Any investigation in the future can use these same methods to compare the results with this site investigation.

The completeness of the results was determined by the number of valid analyses compared to invalid analyses. This is determined from the results of the data validation procedure.

D-1 HOLDING TIMES

Soil and water samples were analyzed for volatile organics and semi-volatile organics by CLP procedures and priority pollutant metals by SW-846 Methods. Holding times were reviewed for these analyses and summarized in Tables D-1 and D-2 for soil and water samples, respectively.

The sample ID's, date of sampling, date of extraction (if applicable) and date of analyses are indicated. The number of days elapsed from sampling to analysis and if appropriate to extraction, are shown for each analytical procedure. Analyses which exceed the holding times are marked.

Guidelines for holding times are taken from the HAZWRAP document "Requirements for Quality Control of Analytical Data" DOE/HWP-65/R1. All volatiles organic analyses and metals analyses were within holding time. For the semi-volatile organic analyses, one water and one soil were extracted out of holding times. Due to exceeded holding times, the data is flagged as estimated.

D-2 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data represents the characteristics of a population. This is determined by the field sampling program. The analytical results for the trip blanks, field blanks and rinseate blanks are summarized in Table D-3. The results of the method blanks are summarized in Table D-4.

Field Blanks

A field blank is a sample of the water source used for decontamination. It is placed directly from the source bottle into an appropriate sample container. Three types of

field blanks were collected during this site work. Samples designated with a "DT" were collected from the drillers tap water which was transported on site and used as an initial rinse. Samples designated with a "ST" were collected from the site tap water which was also used as an initial rinse. Samples designated with a "DI" were collected from bottled deionized organic-free water. All three types of field blanks show several similar volatile organics at low levels (5 to 20 ppb). There are also a few metals present at concentrations much below the MCLs.

Trip Blanks

A trip blank consisted of deionized organic-free water in VOA vials filled by the laboratory for purposes of traveling with a cooler of samples back to the lab. The trip blanks were only analyzed for volatile organics. With one exception, the only volatile organics detected in the field blanks were methylene chloride and acetone which are common lab contaminants. Since the concentrations are all very close or less than the Contract Required Quantitation Limit (CRQL) and, in many cases, were also found in the associated method blank, it is not felt that their presence is a cause of concern. The presence of these compounds indicates a laboratory induced contamination rather than a contamination occurring during shipment. The one exception is 1 ppb of 1,1,1-trichloroethane found in the trip blank identified as RB-HW-TB4. However, no 1,1,1-trichloroethane was found in any associated environment samples.

Rinseate Blanks

Rinseate blanks consisted of deionized organic-free water poured through the decontaminated bailer, split-spoon, or trowel into sample bottles. Decontamination steps were as follows: Liquinox site tap water wash, site tap water rinse, deionized water rinse, methanol rinse, air dry. Most of these rinseate blanks have some, but not all of the volatile organics found in the field blanks. After reviewing the method blank data, all the compounds except chloroform can be eliminated. Metals were also found in the rinseate blanks at levels much below the MCLs.

Method Blanks

Method blanks are aliquots of analyte-free water analyzed with a sample batch to identify contaminants introduced by the preparation or analysis procedure. If a compound found in an environmental sample is also found in the corresponding method blank, then the result is flagged or footnoted in the results table. For common lab contaminants, if the analyte is less than ten times the concentration in the blank, it should be regarded as not detected. For compounds which are not common lab contaminants, the factor used is five.

The volatile and semi-volatile organics found in the method blanks are listed in Table D-4. This information was used to validate the results along with the results of the field blanks, trip blanks and rinseate blanks. Most of the volatile organic results had low levels of common laboratory contaminants. Virtually all these were eliminated after reviewing their respective associated blank data. Actions taken are summarized in the validation notes.

Approximately fifteen soil samples had phthalate levels below the CRQL but above the instrument detection limit (IDL) so they were flagged as estimated (J). In general, the associated method blanks did not have any phthalates. However, since they are considered common lab contaminants, are found at low levels and there is no reason to suspect they are actually present at the site, their presence in the samples should be considered unlikely.

Most of the preparation blanks for the metals analyses had low levels of one or two elements. Any concentration of these metals found in the sample within five times the amount found in the blank was flagged as estimated (J). See the validation notes for details.

Discussion of Blank Results

As mentioned above, there were several volatile organics found in the field blanks. After review of the method blank data, methylene chloride, acetone and 1,1,1-trichloroethylene can be eliminated from the field blanks. However, the field blanks contained several volatile organics whose source is unclear. These are chloroform,

bromoform, bromodichloromethane, and dibromochloromethane. None of these compounds were found in the method blanks which indicates that it was not a laboratory-introduced contamination. These were also not found in the trip blanks, so they were not introduced during transportation. Therefore, these compounds may actually be present in the source waters.

The other notable fact is that all three types of field blanks have some combination of these four contaminants. The drillers tap water has all four compounds. This agrees with the results of a field expedition in the fall of 1989 at other sites at RANGB, where the same drillers were used. The site tap water shows everything except bromoform. The deionized water has chloroform in all three samples. Bromodichloromethane is also in one field blank and benzene is in another. This deionized water is from the same lot used during the field work in the fall of 1989. Chloroform was also found in a field blank from that period.

If there is chloroform actually present in the deionized water, it would also show up in the results of the rinseate blanks. Reviewing this data with the method blanks, everything except chloroform can be eliminated. This corresponds to the results of the deionized water field blanks.

In conclusion, the site tap water and drillers tap water show low levels of three to four volatile organics. The deionized water contains low levels of chloroform. Since this water is used after the tap water in the decontamination process, chloroform should be the only volatile organic to possibly show up in the environmental samples. If chloroform does show up in low levels (within five times the detection limit), the data will be considered suspect. However, no chloroform was found in the environmental samples.

There may be a few metals present in the source water but at such low levels that their presence would not affect results of the environmental samples. Cadmium and mercury were the only metals found in the rinseate blanks that were not in the field blanks. This could be due to incomplete decontamination procedures, however, the levels were very low (about 1 ppb) and it is unlikely this would impact any subsequent sampling events.

Duplicate Samples

Tables D-5 and D-6 summarize the analytical results of the soil and water duplicate samples, respectively. The relative percent difference (RPD) is calculated for each compound that was detected in a given duplicate set. The number of soil and water samples collected does meet the required frequency of ten percent (10%).

Table D-5 shows that the duplicate semi-volatile and metal results of the soil samples show good agreement. The volatile organic results do not show as good agreement. However, this may be due to the volatility of the parameters and the heterogeneous nature of the soil.

One water duplicate set was analyzed for semi-volatile and volatile organics and dissolved metals. The same semi-volatile compound was found in each sample at the same concentration. Volatile organics were not found in either sample. Four dissolved metals were found in each sample of comparable concentrations. The other duplicate set was analyzed for total metals. The results showed more variability than in the dissolved sample set results which is expected. Overall, the duplicate water results were acceptable.

D-3 PRECISION AND ACCURACY

Precision and accuracy are assessed from the results obtained from the analysis of matrix spike and matrix spike duplicate samples and surrogate spiked samples.

Precision

Precision refers to the relative percent difference (RPD) in values obtained from two duplicate samples, in this case matrix spike duplicate samples. RPD is calculated as follows:

$$\text{Relative Percentage Difference} = \frac{2\,(C_1 - C_2) \times 100}{C_1 + C_2}$$

Where:

C_1, C_2 = The two values obtained by analyzing duplicate samples

Acceptable levels of precision vary according to the sample matrix, the specific analytical method, and the analytical concentration relative to the method detection limit. The data is not qualified on the matrix spike/matrix spike duplicate (MS/MSD) results alone. This information is used in conjunction with other criteria to determine the need for action.

RPDs for volatiles and semi-volatile organic analyses were all within range. Some RPDs for metal analyses were out of range, but were not considered to be grossly out of range. No further action was taken.

Accuracy

Accuracy refers to the correctness of the value obtained from the preparation and analysis of a sample. It is determined by comparing the analytical results of a given sample and its corresponding matrix spike sample. Surrogate compounds added to each sample also make it possible to evaluate the analytical accuracy. Accuracy is expressed as percentage recovery and is calculated using the following formula:

$$\text{Percentage Recovery (PR)} = \frac{(S_S - S_O)}{S} \times 100$$

Value:

S_O = Background value, the value obtained by analyzing the sample before spiking;

S = Concentration corresponding to the spike addition to the sample; and

S_S = Value obtained by analyzing the matrix spike sample with the spike added.

The degree of accuracy, or PR, to be expected is dependent upon the sample matrix, specific analytical method, and the concentration of the analyte relative to its detection limit. The closer the measured value is to the detection limit, the lower the accuracy of analysis. Metals and other inorganic water quality parameters are normally determined within the range of 75 to 125 percent or as specified by Laboratory Control Charts.

The procedures for spike samples to be analyzed by gas chromography methods are described in each respective method. The expected range for recoveries of each compound are also provided in the method descriptions.

If quality control results demonstrated an out of control situation for the spiked sample or spiked duplicate sample, a corrective action was taken. This may have included checking the calculations, flagging data in accordance with the procedures prescribed for the method, recalibration of the instrument, re-extraction, and/or re-analyses of the samples.

In Work Order 1636, two surrogates for the volatile organics for sample RB-HW-AB12-SS7 were out of range. As required, the laboratory reextracted and reanalyzed. The results of the reanalysis had the same problem. This sample also had one internal standard area out of range. The data from the first analysis was used and flagged as estimated.

In the semi-volatile organic analysis, some PR's of the matrix spike analysis were out of range. In all cases, these PR's were barely out of range (1 to 2 percent outside of the range) and no further action was justified.

In the semi-volatile organic analysis of RB-HW-SU45 and SU46, three internal standards were out of range for both samples Reanalysis was done and again the same three standards were out. The data for both samples is considered approximate and was flagged appropriately (J).

For the metals analysis, several of the data packages had spike recoveries outside of the acceptable range of 75 to 125 percent. Associated samples were flagged according to HAZWRAP validation guidelines. Spike recoveries for antimony of less than 30 percent caused 31 results for that metal to be qualified as invalid (R). See validation notes for details.

D-4 COMPARABILITY

Comparability qualitatively expresses the confidence with which one data set can be compared with another. The analytical methods used for this investigation are documented standard methods. Although CLP methods were not used for the metals analysis, CLP-type data packages were received for all analyses. Future investigations using the same standard methods can be compared to this investigation.

D-5 COMPLETENESS

The completeness of the data is the percentage of analyses which are judged to be valid and is determined by calculating the number of invalid analyses. Invalid analyses can include those analyses which were not performed by the lab or those analyses which are disqualified due to quality control problems. Thirty-one antimony results were flagged as invalid due to very low spike recoveries. Since the rest of the metals results and all of the volatile and semi-volatile organic results are considered valid, the goal of 90 percent completeness was achieved.

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1657

SAMPLE ID: MW7-GW1 (1657-13)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common lab. contaminants

MC 50B ⇒ 50 UJ

Note: There is a change in the flags between DOE/HWP-65 and DOE/HWP-65/R1. When a cmpd is found in blank & sample. 65 says flag as UJ, 65/R1 says flag as U. Since the data validation was performed when 65 was in effect, flags will remain as UJ.

WORK ORDER #: 1657

SAMPLE ID: MW8-GW1 (1657-15)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common lab contaminants

MC 4 J ⇒ 5 UJ

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1630
SAMPLE ID: AB1-SS1 (1630-01)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common lab contam.
18 B MC ⇒ 18 UJ
13 J A ⇒ 100 UJ
6 J MEK ⇒ 100 UJ
1 J T ⇒ 5 UJ

WORK ORDER #: 1630
SAMPLE ID: AB1-SS2
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common lab contam.
1800 B MC ⇒ 1800 UJ
2400 J A ⇒ 12,500 UJ
6900 J MEK ⇒ 12,500 UJ
dil. fact x 125

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1630

SAMPLE ID: AB2-SS1 (1630-03)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Cont. + others

7 B MC ⇒ 7 UJ

24 J A ⇒ 100 UJ

1,1,1 TCA 3J ⇒ 5 UJ (in FB 4)

1 J Benzene ⇒ no action

WORK ORDER #: 1630

SAMPLE ID: AB2-SS2 (1630-04)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Cont.

9 MC ⇒ 9 UJ

4 J A ⇒ 100 UJ

4 J MEK ⇒ 100 UJ

1 J T ⇒ 5 UJ

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1630

SAMPLE ID: AB5-SS2 (1630-06)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Cont.

10 B MC ⇒ 10 UJ
11 J A ⇒ 100 UJ
5 J MEK ⇒ 100 UJ
1 J T ⇒ 5 UJ

WORK ORDER #: 1630

SAMPLE ID: AB8-SS1 (1630-07)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Cont.

10 B MC ⇒ 10UJ
9 J A ⇒ 100 UJ
6 J MEK ⇒ 100 UJ
1 J T ⇒ 5 UJ

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1630
SAMPLE ID: AB8-SS2 (1630-08)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Cont.

12 B MC ⇒ 12 UJ
9 J A ⇒ 100 UJ
8 J MEK ⇒ 100 UJ
2 J T ⇒ 5 UJ

WORK ORDER #: 1633
SAMPLE ID: AB3-SS1 (1633-01)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Cont.

10 B MC ⇒ 10 UJ
17 J A ⇒ 100 UJ
8 J MEK ⇒ 100 UJ

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1633
SAMPLE ID: AB3-SS3 (1633-02)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Cont.

12 B MC ⇒ 12 UJ
20 J A ⇒ 100 UJ
9 J MEK ⇒ 100 UJ

WORK ORDER #: 1633
SAMPLE ID: AB4-SS1 (1633-03)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Cont.

13 B MC ⇒ 13 UJ
25 J A ⇒ 100 UJ

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1633
SAMPLE ID: AB4-SS2 (1633-04)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
13 B MC → 13 UJ
250 D A → no action

WORK ORDER #: 1633
SAMPLE ID: AB6-SS1 (1633-05)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
39 MC → 39 UJ
9 J A → 100 UJ
5 J MEK → 100 UJ

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1633
SAMPLE ID: AB6-SS2 (1633-06)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.

12 MC ⟹ 12 UJ
6 J · A ⟹ 100 UJ
8 J MEK ⟹ 100 UJ
1 J Benzene ⟹ No action

WORK ORDER #: 1633
SAMPLE ID: AB7-SS1 (1633-07)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.

130 B MC ⟹ No action (8 in MB)
37 J A ⟹ 100 UJ
8 J MEK ⟹ 100 UJ

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1633
SAMPLE ID: AB7-SS2 (1633-08)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.

21	B	MC	⇒	21 UJ
23	J	A	⇒	100 UJ
7	J	MEK	⇒	100 UJ

WORK ORDER #: 1633
SAMPLE ID: AB9-SS1 (1633-09)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.

13	B	MC	⇒	13 UJ
21	J	A	⇒	100 UJ
8	J	MEK	⇒	100 UJ

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1633

SAMPLE ID: AB9-SS2 (1633-10)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

11 B MC ⟹ 11 UJ

63 J A ⟹ 100 UJ

13 J MEK ⟹ 100 UJ

WORK ORDER #: 1633

SAMPLE ID: AB10-SS1 (1633-11)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab. Contam.

22 B MC ⟹ 22 UJ

19 J A ⟹ 100 UJ

6 J MEK ⟹ 100 UJ

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: KICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1633

SAMPLE ID: AB10-SS2 (1633-12)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

14 B MC ⇒ 14 UJ

16 J A ⇒ 100 UJ

7 J MEK ⇒ 100 UJ

WORK ORDER #: 1636

SAMPLE ID: AB12-SS3 (1636-01)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

11 B MC ⇒ 11 UJ

36 J A ⇒ 100 UJ

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1636

SAMPLE ID: AB12-SS7 (1636-02)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

21 B MC ⟹ 21 UJ

40 J A ⟹ 100 UJ

WORK ORDER #: 1636

SAMPLE ID: AB13-SS5 (1636-03)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

37 B MC ⟹ 37 UJ

19 J A ⟹ 100 UJ

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1636
SAMPLE ID: AB13-SS7 (1636-04)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
27 B MC ⟹ 27 UJ
7 J A ⟹ 100 UJ

WORK ORDER #: 1637
SAMPLE ID: AB14-SS2 (1637-01)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
1300 B MC ⟹ 5 x 114 = 570
dil. fact. 114 ⟹ 1300 UJ
MB → 1200 MC dil factor 125

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1637

SAMPLE ID: AB 14-SS7 (1637-02)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

8 B MC ⟹ 8 UJ

18 J A ⟹ 100 UJ

6 Benzene ⟹ no action

WORK ORDER #: 1637

SAMPLE ID: D5 (1637-03)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

10 B MC ⟹ 10 UJ

27 J A ⟹ 100 UJ

1 J TCE ⟹ No action

8 T ⟹ 8 UJ

5 J Benzene ⟹ No action

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1637

SAMPLE ID: AB15-SS3 (1637-04)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

MC	49 B	⟹	9 x 10 x 4 (360) MB	49 UJ
A	640	⟹	6 x 10 x 4 (240)	No action
MEK	43 J	⟹	6 x 10 x 4 (240)	43 UJ

dilution factor 4

WORK ORDER #:

SAMPLE ID: AB15-SS8 (1637-05)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

42 B	MC	⟹	42 UJ
43 J	A	⟹	100 UJ
4 J	TCE	⟹	No action

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1637
SAMPLE ID: D4 (1637-06)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
15 B MC ⇒ 15 UJ
28 J A ⇒ 100 UJ

WORK ORDER #:
SAMPLE ID: MW4-SS2 (1643-04) / MW4-SS3 (1643-05)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.

MC	11B ⇒ 11 UJ	10B ⇒ 10 UJ
A	15J ⇒ 100 UJ	14J ⇒ 100 UJ
MEK	6J ⇒ 100 UJ	6J ⇒ 100 UJ

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1643

SAMPLE ID: AB 11-SS4 (1643-07) / AB 11-SS7 (1643-08)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam

MC	6 JB ⇒ 6 UJ	9 B ⇒ 9 UJ
A	3 J ⇒ 100 UJ	12 J ⇒ 100 UJ
MEK		6 J ⇒ 100 UJ

WORK ORDER #: 1645

SAMPLE ID: MW6-SS2 (1645-01) / MW6-SS3 (1645-02)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

MC	22 B ⇒ 22 UJ	31 B ⇒ 31 UJ
A	9 J ⇒ 100 UJ	7 J ⇒ 100 UJ
MEK	10 J ⇒ 100 UJ	7 J ⇒ 100 UJ

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1645

SAMPLE ID: MW7-SS2 (1645-03) / MW7-SS3 (1645-04)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

MC	1900 B ⟹ 1900 UJ	8 B ⟹ 8 UJ
111TCA	86 J ⟹ No action	—
A	—	19 J ⟹ 100 UJ
MEK	—	3 J ⟹ 100 UJ
dil. factor	116	T 4 J ⟹ Benzene present so Toluene may be present.

WORK ORDER #:

SAMPLE ID: MW8-SS2 (1645-05) / MW8-SS3 (1645-06)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common / Lab Contam.

MC	10 B ⟹ 10 UJ	16 B ⟹ 16 UJ
A	15 J ⟹ 100 UJ	15 J ⟹ 100 UJ
MEK	6 J ⟹ 100 UJ	8 J ⟹ 100 UJ

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1645

SAMPLE ID: D6 (1645-07) / D7 (1645-08)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

MC	4JB → 5UJ	9B → 9UJ
A	3J → 100 UJ	22J → 100 UJ
MEK	—	9J → 100 UJ

WORK ORDER #: 1647

SAMPLE ID: MW5-SS2 (1647-01) / MW5-SS3 (1647-02)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Common Lab Contam.

MC	12B → 12UJ	1600B → 1600UJ
A	7J → 100 UJ	—
MEK	7J → 100 UJ	—

dil factor 125

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #:
SAMPLE ID: MW9-SS2 (1665-03) / MW9-SS3 (1665-04)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.

MC	8	→ 8 UJ	7	→ 7 UJ
A	35	→ 100 UJ	—	

WORK ORDER #: 1643
SAMPLE ID: AB11-SS4 (1643-07)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Missed Holding time (CLP)
Sampled 1/26 anal 2/8
According to lab, sample was received 1/30/90, so anal was w/in HT (10 days from VTSR)
ACTION: NONE. this is within the 14 day HT.

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACHER ANGB

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1636

SAMPLE ID: RB-HW-AB12-SS7 (1636-02)

ANALYSIS: V-CLP

PROBLEM AND ACTION: 2 Surrogates out of limits.
Reanalysis had same problem.

ACTION: Use original data + flag everything with a (J) as estimated.

WORK ORDER #: 1636

SAMPLE ID: RB-HW-AB12-SS7 (1636-02)

ANALYSIS: V-CLP

PROBLEM AND ACTION: Internal Standard Area
IS area outside of the range.
data is already flagged as estimated because of surrogates out of limits.

ACTION: Same as above

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1627

SAMPLE ID: SL49-SS3 (1627-037)

ANALYSIS: SV-CLP

PROBLEM AND ACTION: Matrix Spike

MSD PR of 1,2,4-TCB low ~~30~~ 36% limit (38-107)

MS PR is 38%

PR of MSD is barely out of range.

ACTION: NONE

WORK ORDER #: 1630, 1633, 1636, 1637, 1643, 1645, 1647

SAMPLE ID:

ANALYSIS: SV-CLP

PROBLEM AND ACTION: Matrix Spike

Out of 3 spiked samples, 3 out of 6 PR for 1,2,4 TCB are low (38-107 range) lowest one was 36. This is not enough to act upon. In one spiked sample, both MS, MSD PR of PCP is high, (range 17-109) values 111, 117. barely high. nothing in samples. blank spikes OK.

ACTION: NONE

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1657
SAMPLE ID: 1657.03 MW1 GW2
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
Acetone at 100 ug/L ⇒ 100 UJ

WORK ORDER #: 1657
SAMPLE ID: 1657.13 (MW7-GW1)
ANALYSIS: V-CLP
PROBLEM AND ACTION: Common Lab Contam.
Acetone 540J ug/L
dilution factor 10
⇒ ~~540~~ 1000 UJ

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1665

SAMPLE ID:

ANALYSIS: SV-CLP

PROBLEM AND ACTION: Matrix/Spike

PR of 1,2,4 TCB low for MS 37%

VS. (38-107)

barely low

NO ACTION.

WORK ORDER #: 1627, 1633

SAMPLE ID: ~~SWA9-SS3 (1627-037)~~, AB4-SS1 (1633-03)

ANALYSIS: SV-CLP

PROBLEM AND ACTION: Extracted out of Holding Time.

~~EST~~ ~~1627-037 25 days~~ } from sampling date to extract date.

this sample is OK. wrong sampling date was reviewed. 1633-03 20 days }

This exceeds all guidance limits

ACTION: flag data as estimated

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKEN BACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1657

SAMPLE ID: MW3-GW2 (1657-02)

ANALYSIS: SV-CLP

PROBLEM AND ACTION: HOLDING TIME

date sampled 2/6/90 } 8 days
date extracted 2/14/90 }

HAZWRAP DOE/HWP-65/R1
requires extraction in 7 days
for water samples.

ACTION: flag data as estimated.

WORK ORDER #:

SAMPLE ID:

ANALYSIS:

PROBLEM AND ACTION:

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1627

SAMPLE ID: RB - HW - SU27

ANALYSIS: SV - CLP

PROBLEM AND ACTION: Matrix spike
PR of 1,2,4 TCB low, 36% range (38 - 107)
MS OK. MSD barely out
ACTION: NONE

WORK ORDER #: 1627

SAMPLE ID: SU45 (1627-27), SU46 (1627-28)

ANALYSIS: SV-CLP

PROBLEM AND ACTION: Internal Standards out for both samples. IS 4, 5 and 6 are out. Reanalysis was done and the same 3 standards are still out. Data must be considered approx.
ACTION: flag all data (J).

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER
LAB: ESBL
DATE OF REPORT: 1990

WORK ORDER #: 1627, 1636, 1637, 1643
SAMPLE ID:
ANALYSIS: Metals - CLP
PROBLEM AND ACTION: preparation blank
lead, furnace 0.540 mg/kg
the lowest analyte conc. is not < 5 x
the blank therefore no further action
or ~~or~~ flags are necessary.
ACTION: None.

WORK ORDER #: 1627, 1636, 1637, 1643
SAMPLE ID:
ANALYSIS: Metals - CLP
PROBLEM AND ACTION: Spike recovery outside of
75 - 125 %
Samples are flagged with an N for
Antimony, Cu, Pb, Tl, Zn.
ACTION: flag samples as estimated (J)
following outlined procedures

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1630, 1633

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

Pb (f) 0.413 mg/kg. x 5 = ~2

Tl 0.099 B x 5 = ~0.5

Zn 2.3 x 5 = 11.5

flag Pb(f), Tl + Zn samples that have values less than the above amounts

WORK ORDER #: 1630, 1633

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Spike recovery outside of 75-125%

Sb 17.2% (<30%) detects as (J) nondetects (R)

As 134.7% detects as (J) nondetects —

Se 71.3 % detects as (J) nondetects (UJ)

Tl 26.4 % (<30%) detects as (J) nondetects (R)

Sb ||||| ||||| ||||| |||| = 19 out of 20 flagged as (R)

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1645, 1647 soils

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

Lead (f) = 0.45 mg/kg × 5 = 2.25

Zn 1.4 mg/kg × 5 = 7.0

flag samples w/ values less than 2.25, 7.0

No samples fell into this category.

WORK ORDER #: 1645, 1647 soils

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Spike Recovery outside 75-125%

Sb	18.2% (<30%)	detects (J)	nondetects (R)
As	34.8%	detects (J)	nondetects (UJ)
Pb	55.0%	detects (J)	nondetects (UJ)
Se(f)	42.2%	detects (J)	nondetects (UJ)

Sb 10 out of 10 results flagged as (R)

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKETT BACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1665 soil

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Spike recovery outside 75-125 %

Sb 11.9% (< 30 %) detects (J) nondetects (R)
As -47.1 (< 30 %) detects (J) nondetects (R)
Pb 48.1 detects (J) nondetects (UJ)

Sb 2 out of 2 samples flagged as (R)

WORK ORDER #: 1627 soils

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

Cr 1.0 B mg/kg × 5 = 5 mg/kg.
Tl 0.15 B × 5 = 0.75 mg/kg.
Zn 1.8 B × 5 = 9.0 mg/kg

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1627 soils up to .17

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Spike recoveries outside 75-125%

		detects	nondetects
Sb	38.6%	(J)	(UJ)
As	273.3%	(J)	data OK
Cr	73.5%	(J)	(UJ)
Tl	216.4%	(J)	data OK
Zn	61.8%	(J)	(UJ)

WORK ORDER #: 1627.18 - .33 soils

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Spike recoveries outside 75-125%

		detects	nondetects
Sb	47.9	(J)	(UJ)
Tl	53.6	(J)	(UJ)
Zn	130.0	(J)	data OK

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1630.09 - .11 , 1636.05

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

Pb (f) 2.8 ug/L x 5 14.0

Zn 9.0 B ug/L x 5 = 45 ug/L

flag samples with values less than 14 and 45.

WORK ORDER #: 1645.09, 1643.01, .02, .06, .10 water

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

Pb(f) = 2.7 B ug/L x 5 = 13.5 ug/L

Zn = 12 B ug/L x 5 = 60

flag samples with values less than 13.5 and 60 ug/L.

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1647, 1657, 1660, 1665 water

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

- Pb 2.2 B ug/L x 5 = 11
  Zn 7.0 B ug/L x 5 = 35
  flag samples with Pb, Zn values less than 11, 35 ug/L

WORK ORDER #: 1665 soil

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: preparation blank

Pb 2.0 B mg/kg. x 5 = 10 mg/kg.
Zn 7.0 B mg/kg x 5 = 35

No samples had values less than 10, 35.

1090DPC/D76a-16#

REVIEWER: JEB
DATE:

DATA VALIDATION NOTES

SITE: PICKLEN BACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1657A water

SAMPLE ID:

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation Blank -

Zn 13.0 B ug/L × 5 = 65

flag any Zn < 65 ug/L.

WORK ORDER #:

SAMPLE ID:

ANALYSIS:

PROBLEM AND ACTION:

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

DATA VALIDATION NOTES

SITE: RICKENBACKER

LAB: ESBL

DATE OF REPORT: 1990

WORK ORDER #: 1627.18 - .33 soils

SAMPLE ID:

ANALYSIS: Metals CLP

PROBLEM AND ACTION: Preparation Blank

Zn 1.5 mg/kg x 5 = 7.5

there are no Zn below 7.5.

WORK ORDER #: 1627.34 - .36 1630.09 - .11 water

SAMPLE ID: 1636.05

ANALYSIS: Metals - CLP

PROBLEM AND ACTION: Preparation blank

Pb 2.8 ug/L x 5 = 14 ug/L

Zn 9.0 ug/L x 5 = 45 ug/L

flag all Pb, Zn less than

14, 45

1090DPC/D76a-16#

REVIEWER: JEB

DATE:

Table D-1
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
SOIL ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	CLP VOLATILE ORGANICS			CLP BASE NEUTRAL SEMI-VOLATILE ORGANICS					
		ANALYZED	# of days	(14 days)	EXTRACTED	# of days	(14 days)	ANALYZED	# of days	(40 days)
RB-HW-SU19	18-Jan-90	--	--		19-Jan-90	1	OK	23-Jan-90	4	OK
RB-HW-SU20	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU21	18-Jan-90	--	--		25-Jan-90	7	OK	30-Jan-90	11	OK
RB-HW-SU22	18-Jan-90	--	--		19-Jan-90	1	OK	23-Jan-90	4	OK
RB-HW-SU23	18-Jan-90	--	--		19-Jan-90	1	OK	22-Jan-90	3	OK
RB-HW-SU24	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU25-SS2	18-Jan-90	--	--		29-Jan-90	11	OK	30-Jan-90	11	OK
RB-HW-SU26	18-Jan-90	--	--		19-Jan-90	1	OK	22-Jan-90	3	OK
RB-HW-SU27	18-Jan-90	--	--		19-Jan-90	1	OK	22-Jan-90	3	OK
RB-HW-SU28	18-Jan-90	--	--		19-Jan-90	1	OK	22-Jan-90	3	OK
RB-HW-SU29	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU30	18-Jan-90	--	--		19-Jan-90	1	OK	19-Jan-90	0	OK
RB-HW-SU31	18-Jan-90	--	--		19-Jan-90	1	OK	23-Jan-90	4	OK
RB-HW-SU32	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU33-SS2	18-Jan-90	--	--		29-Jan-90	11	OK	30-Jan-90	11	OK
RB-HW-SU34	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU35	18-Jan-90	--	--		22-Jan-90	4	OK	24-Jan-90	5	OK
RB-HW-SU36	18-Jan-90	--	--		22-Jan-90	4	OK	25-Jan-90	6	OK
RB-HW-SU37	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU38	18-Jan-90	--	--		22-Jan-90	4	OK	24-Jan-90	5	OK
RB-HW-SU39	18-Jan-90	--	--		22-Jan-90	4	OK	24-Jan-90	5	OK
RB-HW-SU40	18-Jan-90	--	--		22-Jan-90	4	OK	23-Jan-90	4	OK
RB-HW-SU41	18-Jan-90	--	--		22-Jan-90	4	OK	24-Jan-90	5	OK
RB-HW-SU42	18-Jan-90	--	--		23-Jan-90	5	OK	23-Jan-90	4	OK
RB-HW-SU43	18-Jan-90	--	--		23-Jan-90	5	OK	23-Jan-90	4	OK
RB-HW-SU44	18-Jan-90	--	--		23-Jan-90	5	OK	06-Feb-90	18	OK
RB-HW-SU45	18-Jan-90	--	--		25-Jan-90	7	OK	25-Jan-90	6	OK
RB-HW-SU46	18-Jan-90	--	--		25-Jan-90	7	OK	25-Jan-90	6	OK
RB-HW-SU47	18-Jan-90	--	--		23-Jan-90	5	OK	24-Jan-90	5	OK
RB-HW-SU48	18-Jan-90	--	--		23-Jan-90	5	OK	24-Jan-90	5	OK
RB-HW-SU49-SS3	31-Jan-90	--	--		12-Feb-90	12	OK	12-Feb-90	11	OK

AD-A252 273 RICKENBACKER AIR NATIONAL GUARD BASE COLUMBUS OHIO PRE-CLOSURE SAMPLING REPORT HAZARDOUS WASTE STORAGE AREA VOLUME 1(U) MARTIN MARIETTA ENERGY SYSTEMS INC OAK RIDGE TN MAR 92 DE-AC05-840R21400

3/3

UNCLASSIFIED

NL

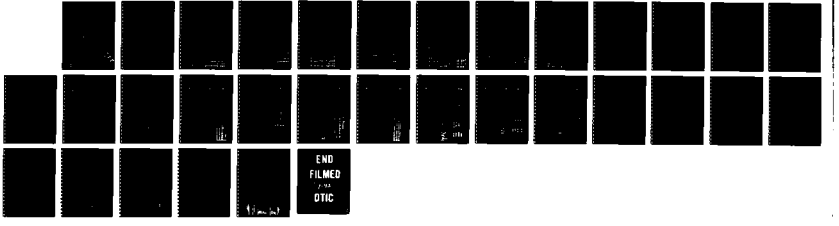
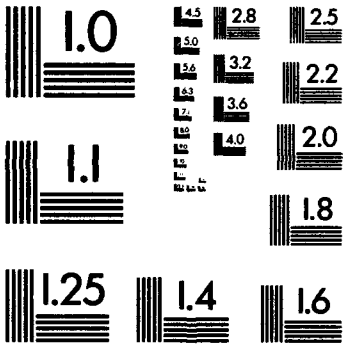
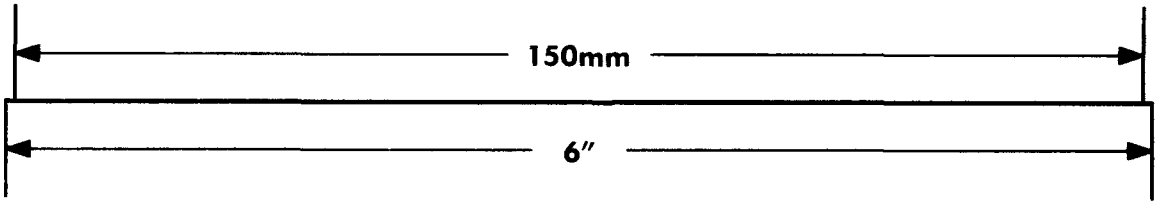


IMAGE EVALUATION
TEST TARGET (MT-3)





PHOTOGRAPHIC SCIENCES CORPORATION
770 BASKET ROAD
P.O. BOX 338
WEBSTER, NEW YORK 14580
(716) 265-1600

Table D – 1
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
SOIL ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	PRIORITY POLLUTANT METALS					
		COMPLETED	# of days	(6 mos.)	MERCURY	# of days	(28 days)
RB-HW-SU19	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU20	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU21	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU22	18-Jan-90	06-Feb-90	19	OK	26-Jan-90	8	OK
RB-HW-SU23	18-Jan-90	06-Feb-90	19	OK	26-Jan-90	8	OK
RB-HW-SU24	18-Jan-90	06-Feb-90	19	OK	26-Jan-90	8	OK
RB-HW-SU25-SS2	18-Jan-90	--			--		
RB-HW-SU26	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU27	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU28	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU29	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU30	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU31	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU32	18-Jan-90	31-Jan-90	13	OK	26-Jan-90	8	OK
RB-HW-SU33-SS2	18-Jan-90	02-Feb-90	15	OK	02-Feb-90	15	OK
RB-HW-SU34	18-Jan-90	--			--		
RB-HW-SU35	18-Jan-90	--			--		
RB-HW-SU36	18-Jan-90	31-Jan-90	13	OK	30-Jan-90	12	OK
RB-HW-SU37	18-Jan-90	31-Jan-90	13	OK	30-Jan-90	12	OK
RB-HW-SU38	18-Jan-90	31-Jan-90	13	OK	30-Jan-90	12	OK
RB-HW-SU39	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU40	18-Jan-90	--			--		
RB-HW-SU41	18-Jan-90	--			--		
RB-HW-SU42	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU43	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU44	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU45	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU46	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU47	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU48	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-SU49-SS3	31-Jan-90	05-Feb-90	5	OK	30-Jan-90	-1	OK

Table D-1
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
SOIL ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	CLP VOLATILE ORGANICS			CLP BASE NEUTRAL SEMI-VOLATILE ORGANICS					
		ANALYZED	# of days	(14 days)	EXTRACTED	# of days	(14 days)	ANALYZED	# of days	(40 days)
RB-HW-AB1-SS1	22-Jan-90	25-Jan-90	3	OK	26-Jan-90	4	OK	31-Jan-90	8	OK
RB-HW-AB1-SS2	22-Jan-90	26-Jan-90	4	OK	26-Jan-90	4	OK	30-Jan-90	7	OK
RB-HW-AB2-SS1	22-Jan-90	26-Jan-90	4	OK	25-Jan-90	3	OK	26-Jan-90	3	OK
RB-HW-AB2-SS2	22-Jan-90	26-Jan-90	4	OK	25-Jan-90	3	OK	30-Jan-90	7	OK
RB-HW-AB3-SS1	23-Jan-90	30-Jan-90	7	OK	25-Jan-90	2	OK	30-Jan-90	6	OK
RB-HW-AB3-SS2	23-Jan-90	31-Jan-90	8	OK	26-Jan-90	3	OK	31-Jan-90	7	OK
RB-HW-AB4-SS1	23-Jan-90	29-Jan-90	6	OK	12-Feb-90	20	*OVER*	12-Feb-90	19	OK
RB-HW-AB4-SS2	23-Jan-90	29-Jan-90	6	OK	26-Jan-90	3	OK	31-Jan-90	7	OK
RB-HW-AB5-SS1	22-Jan-90	25-Jan-90	3	OK	01-Feb-90	10	OK	06-Feb-90	14	OK
RB-HW-AB5-SS2	22-Jan-90	25-Jan-90	3	OK	26-Jan-90	4	OK	30-Jan-90	7	OK
RB-HW-AB6-SS1	23-Jan-90	26-Jan-90	3	OK	26-Jan-90	3	OK	31-Jan-90	7	OK
RB-HW-AB6-SS2	23-Jan-90	26-Jan-90	3	OK	29-Jan-90	6	OK	31-Jan-90	7	OK
RB-HW-AB7-SS1	23-Jan-90	30-Jan-90	7	OK	26-Jan-90	3	OK	31-Jan-90	7	OK
RB-HW-AB7-SS2	23-Jan-90	30-Jan-90	7	OK	26-Jan-90	3	OK	31-Jan-90	7	OK
RB-HW-AB8-SS1	22-Jan-90	25-Jan-90	3	OK	26-Jan-90	4	OK	30-Jan-90	7	OK
RB-HW-AB8-SS2	22-Jan-90	25-Jan-90	3	OK	25-Jan-90	3	OK	27-Jan-90	4	OK
RB-HW-AB9-SS1	23-Jan-90	30-Jan-90	7	OK	29-Jan-90	6	OK	31-Jan-90	7	OK
RB-HW-AB9-SS2	23-Jan-90	30-Jan-90	7	OK	29-Jan-90	6	OK	31-Jan-90	7	OK
RB-HW-AB10-SS1	23-Jan-90	31-Jan-90	8	OK	29-Jan-90	6	OK	31-Jan-90	7	OK
RB-HW-AB10-SS2	23-Jan-90	31-Jan-90	8	OK	29-Jan-90	6	OK	01-Feb-90	8	OK
RB-HW-AB11-SS4	26-Jan-90	08-Feb-90	13	OK	31-Jan-90	5	OK	06-Feb-90	10	OK
RB-HW-AB11-SS7	26-Jan-90	01-Feb-90	6	OK	31-Jan-90	5	OK	06-Feb-90	10	OK
RB-HW-AB12-SS3	24-Jan-90	30-Jan-90	6	OK	29-Jan-90	5	OK	01-Feb-90	7	OK
RB-HW-AB12-SS7	24-Jan-90	31-Jan-90	7	OK	29-Jan-90	5	OK	31-Jan-90	6	OK
RB-HW-AB13-SS5	24-Jan-90	30-Jan-90	6	OK	29-Jan-90	5	OK	31-Jan-90	6	OK
RB-HW-AB13-SS7	24-Jan-90	30-Jan-90	6	OK	29-Jan-90	5	OK	31-Jan-90	6	OK
RB-HW-AB14-SS2	25-Jan-90	05-Feb-90	11	OK	30-Jan-90	5	OK	31-Jan-90	5	OK
RB-HW-AB14-SS7	25-Jan-90	30-Jan-90	5	OK	30-Jan-90	5	OK	02-Feb-90	7	OK
RB-HW-AB15-SS3	25-Jan-90	05-Feb-90	11	OK	30-Jan-90	5	OK	02-Feb-90	7	OK
RB-HW-AB15-SS8	25-Jan-90	31-Jan-90	6	OK	30-Jan-90	5	OK	06-Feb-90	11	OK

Table D-1
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
SOIL ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	PRIORITY POLLUTANT METALS					
		COMPLETED	# of days	(6 mos.)	MERCURY	# of days	(28 days)
RB-HW-AB1-SS1	22-Jan-90	12-Feb-90	21	OK	06-Feb-90	15	OK
RB-HW-AB1-SS2	22-Jan-90	12-Feb-90	21	OK	06-Feb-90	15	OK
RB-HW-AB2-SS1	22-Jan-90	12-Feb-90	21	OK	06-Feb-90	15	OK
RB-HW-AB2-SS2	22-Jan-90	12-Feb-90	21	OK	06-Feb-90	15	OK
RB-HW-AB3-SS1	23-Jan-90	12-Feb-90	20	OK	06-Feb-90	14	OK
RB-HW-AB3-SS2	23-Jan-90	12-Feb-90	20	OK	06-Feb-90	14	OK
RB-HW-AB4-SS1	23-Jan-90	12-Feb-90	20	OK	06-Feb-90	14	OK
RB-HW-AB4-SS2	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB5-SS1	22-Jan-90	--			--		
RB-HW-AB5-SS2	22-Jan-90	--			--		
RB-HW-AB6-SS1	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB6-SS2	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB7-SS1	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB7-SS2	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB8-SS1	22-Jan-90	12-Feb-90	21	OK	06-Feb-90	15	OK
RB-HW-AB8-SS2	22-Jan-90	12-Feb-90	21	OK	06-Feb-90	15	OK
RB-HW-AB9-SS1	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB9-SS2	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB10-SS1	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB10-SS2	23-Jan-90	13-Feb-90	21	OK	06-Feb-90	14	OK
RB-HW-AB11-SS4	26-Jan-90	08-Mar-90	41	OK	14-Feb-90	19	OK
RB-HW-AB11-SS7	26-Jan-90	08-Mar-90	41	OK	14-Feb-90	19	OK
RB-HW-AB12-SS3	24-Jan-90	--			--		
RB-HW-AB12-SS7	24-Jan-90	--			--		
RB-HW-AB13-SS5	24-Jan-90	--			--		
RB-HW-AB13-SS7	24-Jan-90	--			--		
RB-HW-AB14-SS2	25-Jan-90	--			--		
RB-HW-AB14-SS7	25-Jan-90	--			--		
RB-HW-AB15-SS3	25-Jan-90	08-Mar-90	42	OK	14-Feb-90	20	OK
RB-HW-AB15-SS8	25-Jan-90	08-Mar-90	42	OK	14-Feb-90	20	OK

Table D-1
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
SOIL ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	CLP VOLATILE ORGANICS			CLP BASE NEUTRAL SEMI-VOLATILE ORGANICS				
		ANALYZED	# of days	(14 days)	EXTRACTED	# of days	(14 days)	ANALYZED	# of days (40 days)
RB-HW-MW4-SS2	29-Jan-90	31-Jan-90	2	OK	31-Jan-90	2	OK	06-Feb-90	7 OK
RB-HW-MW4-SS3	29-Jan-90	01-Feb-90	3	OK	31-Jan-90	2	OK	06-Feb-90	7 OK
RB-HW-MW5-SS2	31-Jan-90	05-Feb-90	5	OK	12-Feb-90	12	OK	12-Feb-90	11 OK
RB-HW-MW5-SS3	31-Jan-90	05-Feb-90	5	OK	12-Feb-90	12	OK	12-Feb-90	11 OK
RB-HW-MW6-SS2	30-Jan-90	02-Feb-90	3	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-MW6-SS3	30-Jan-90	02-Feb-90	3	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-MW7-SS2	30-Jan-90	05-Feb-90	6	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-MW7-SS3	30-Jan-90	01-Feb-90	2	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-MW8-SS2	30-Jan-90	01-Feb-90	2	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-MW8-SS3	30-Jan-90	01-Feb-90	2	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-MW9-SS2	09-Feb-90	15-Feb-90	6	OK	21-Feb-90	12	OK	23-Feb-90	13 OK
RB-HW-MW9-SS3	09-Feb-90	15-Feb-90	6	OK	21-Feb-90	12	OK	23-Feb-90	13 OK
RB-HW-D1(SU28)	18-Jan-90	--	--		23-Jan-90	5	OK	24-Jan-90	5 OK
RB-HW-D2(SU41)	18-Jan-90	--	--		23-Jan-90	5	OK	24-Jan-90	5 OK
RB-HW-D3(SU42)	18-Jan-90	--	--		23-Jan-90	5	OK	23-Jan-90	4 OK
RB-HW-D4(AB15-SS8)	25-Jan-90	31-Jan-90	6	OK	30-Jan-90	5	OK	06-Feb-90	11 OK
RB-HW-D5(AB14-SS7)	25-Jan-90	30-Jan-90	5	OK	30-Jan-90	5	OK	02-Feb-90	7 OK
RB-HW-D6(MW6-SS3)	30-Jan-90	08-Feb-90	9	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-D7(MW7-SS3)	30-Jan-90	01-Feb-90	2	OK	01-Feb-90	2	OK	06-Feb-90	6 OK
RB-HW-D6(MW6-SS3)	07-Feb-90	13-Feb-90	6	OK	14-Feb-90	7	OK	14-Feb-90	6 OK
RB-HW-D7(MW7-SS3)	07-Feb-90	--	--		21-Feb-90	14	OK	26-Feb-90	18 OK

Table D-1
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
SOIL ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	PRIORITY POLLUTANT METALS					
		COMPLETED	# of days	(6 mos.)	MERCURY	# of days	(28 days)
RB-HW-MW4-SS2	29-Jan-90	08-Mar-90	38	OK	14-Feb-90	16	OK
RB-HW-MW4-SS3	29-Jan-90	08-Mar-90	38	OK	14-Feb-90	16	OK
RB-HW-MW5-SS2	31-Jan-90	28-Feb-90	28	OK	20-Feb-90	20	OK
RB-HW-MW5-SS3	31-Jan-90	28-Feb-90	28	OK	20-Feb-90	20	OK
RB-HW-MW6-SS2	30-Jan-90	26-Feb-90	27	OK	20-Feb-90	21	OK
RB-HW-MW6-SS3	30-Jan-90	26-Feb-90	27	OK	20-Feb-90	21	OK
RB-HW-MW7-SS2	30-Jan-90	26-Feb-90	27	OK	20-Feb-90	21	OK
RB-HW-MW7-SS3	30-Jan-90	20-Feb-90	21	OK	20-Feb-90	21	OK
RB-HW-MW8-SS2	30-Jan-90	20-Feb-90	21	OK	06-Feb-90	7	OK
RB-HW-MW8-SS3	30-Jan-90	20-Feb-90	21	OK	06-Feb-90	7	OK
RB-HW-MW9-SS2	09-Feb-90	10-Mar-90	29	OK	27-Feb-90	18	OK
RB-HW-MW9-SS3	09-Feb-90	10-Mar-90	29	OK	27-Feb-90	18	OK
RB-HW-D1(SU28)	18-Jan-90	--	--		--	--	
RB-HW-D2(SU41)	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-D3(SU42)	18-Jan-90	05-Feb-90	18	OK	30-Jan-90	12	OK
RB-HW-D4(AB15-SS8)	25-Jan-90	08-Mar-90	42	OK	14-Feb-90	20	OK
RB-HW-D5(AB14-SS7)	25-Jan-90	09-Mar-90	43	OK	14-Feb-90	20	OK
RB-HW-D6(MW6-SS3)	30-Jan-90	28-Feb-90	29	OK	20-Feb-90	21	OK
RB-HW-D7(MW7-SS3)	30-Jan-90	28-Feb-90	29	OK	20-Feb-90	21	OK
RB-HW-D6(MW6-SS3)	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK
RB-HW-D7(MW7-SS3)	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK

Table D-2
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
WATER ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	CLP VOLATILE ORGANICS			CLP BASE NEUTRAL SEMI-VOLATILE ORGANICS					
		ANALYZED	# of days	(14 days)	EXTRACTED	# of days	(7 days)	ANALYZED	# of days	(40 days)
RB-HW-MW1-GW2	06-Feb-90	10-Feb-90		4 OK	13-Feb-90		7 OK	13-Feb-90		6 OK
RB-HW-MW2-GW2	07-Feb-90	12-Feb-90		5 OK	13-Feb-90		6 OK	12-Feb-90		4 OK
RB-HW-MW3-GW2	06-Feb-90	10-Feb-90		4 OK	14-Feb-90		8 *OVER*	14-Feb-90		7 OK
RB-HW-MW4-GW1	06-Feb-90	10-Feb-90		4 OK	13-Feb-90		7 OK	13-Feb-90		6 OK
RB-HW-MW6-GW1	07-Feb-90	12-Feb-90		5 OK	13-Feb-90		6 OK	13-Feb-90		5 OK
RB-HW-MW7-GW1	07-Feb-90	12-Feb-90		5 OK	13-Feb-90		6 OK	13-Feb-90		5 OK
RB-HW-MW8-GW1	07-Feb-90	12-Feb-90		5 OK	13-Feb-90		6 OK	13-Feb-90		5 OK
RB-HW-MW9-GW1	16-Feb-90	22-Feb-90		6 OK	21-Feb-90		5 OK	26-Feb-90		9 OK
RB-HW-RB1	18-Jan-90	--	--		23-Jan-90		5 OK	24-Jan-90		5 OK
RB-HW-RB2	22-Jan-90	26-Jan-90		4 OK	24-Jan-90		2 OK	25-Jan-90		2 OK
RB-HW-RB3	23-Jan-90	--	--		--	--	--	--		--
RB-HW-RB4	24-Jan-90	27-Jan-90		3 OK	30-Jan-90		6 OK	02-Feb-90		8 OK
RB-HW-RB5	25-Jan-90	27-Jan-90		2 OK	01-Feb-90		7 OK	06-Feb-90		11 OK
RB-HW-RB6	26-Jan-90	01-Feb-90		6 OK	30-Jan-90		4 OK	02-Feb-90		6 OK
RB-HW-RB7	29-Jan-90	01-Feb-90		3 OK	30-Jan-90		1 OK	02-Feb-90		3 OK
RB-HW-RB8	30-Jan-90	01-Feb-90		2 OK	05-Feb-90		6 OK	06-Feb-90		6 OK
RB-HW-RB9	31-Jan-90	01-Feb-90		1 OK	--	--	--	--		--
RB-HW-RB10	06-Feb-90	12-Feb-90		6 OK	13-Feb-90		7 OK	13-Feb-90		6 OK
RB-HW-RB11	07-Feb-90	13-Feb-90		6 OK	13-Feb-90		6 OK	13-Feb-90		5 OK
RB-HW-RB12	09-Feb-90	14-Feb-90		5 OK	16-Feb-90		7 OK	19-Feb-90		9 OK
RB-HW-RB13	16-Feb-90	22-Feb-90		6 OK	21-Feb-90		5 OK	23-Feb-90		6 OK
				0 OK						
RB-HW-FB1(DI)	18-Jan-90	--	--		23-Jan-90		5 OK	25-Jan-90		6 OK
RB-HW-FB2(ST)	18-Jan-90	--	--		23-Jan-90		5 OK	24-Jan-90		5 OK
RB-HW-FB3(DT)	22-Jan-90	26-Jan-90		4 OK	24-Jan-90		2 OK	24-Jan-90		1 OK
RB-HW-FB4(DI)	22-Jan-90	26-Feb-90		35 *OVER*	24-Feb-90		33 *OVER*	24-Feb-90		32 OK
RB-HW-FB5(DI)	29-Jan-90	01-Feb-90		3 OK	30-Jan-90		1 OK	02-Feb-90		3 OK
RB-HW-FB6(DT)	29-Jan-90	01-Feb-90		3 OK	30-Jan-90		1 OK	02-Feb-90		3 OK
RB-HW-FB7(ST)	06-Feb-90	10-Feb-90		4 OK	13-Feb-90		7 OK	13-Feb-90		6 OK
RB-HW-FB8(DI)	06-Feb-90	12-Feb-90		6 OK	13-Feb-90		7 OK	13-Feb-90		6 OK
RB-HW-FB9(DI)	16-Feb-90	22-Feb-90		6 OK	21-Feb-90		5 OK	23-Feb-90		6 OK
RB-HW-FB10(ST)	16-Feb-90	22-Feb-90		6 OK	21-Feb-90		5 OK	26-Feb-90		9 OK

Table D-2
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
WATER ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	PRIORITY POLLUTANT METALS					
		COMPLETED	# of days	(6 mos.)	MERCURY	# of days	(20 days)
RB-HW-MW1-GW2	06-Feb-90	09-Mar-90	31	OK	22-Feb-90	16	OK
RB-HW-MW2-GW2	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK
RB-HW-MW3-GW2	06-Feb-90	09-Mar-90	31	OK	22-Feb-90	16	OK
RB-HW-MW4-GW1	06-Feb-90	09-Mar-90	31	OK	22-Feb-90	16	OK
RB-HW-MW6-GW1	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK
RB-HW-MW7-GW1	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK
RB-HW-MW8-GW1	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK
RB-HW-MW9-GW1	16-Feb-90	10-Mar-90	22	OK	27-Feb-90	11	OK
RB-HW-RB1	18-Jan-90	06-Feb-90	19	OK	01-Feb-90	14	OK
RB-HW-RB2	22-Jan-90	12-Feb-90	21	OK	01-Feb-90	10	OK
RB-HW-RB3	23-Jan-90	--	--	--	--	--	--
RB-HW-RB4	24-Jan-90	12-Feb-90	19	OK	01-Feb-90	8	OK
RB-HW-RB5	25-Jan-90	--	--	--	--	--	--
RB-HW-RB6	26-Jan-90	13-Feb-90	18	OK	06-Feb-90	11	OK
RB-HW-RB7	29-Jan-90	13-Feb-90	15	OK	06-Feb-90	8	OK
RB-HW-RB8	30-Jan-90	13-Feb-90	14	OK	06-Feb-90	7	OK
RB-HW-RB9	31-Jan-90	09-Mar-90	37	OK	06-Feb-90	6	OK
RB-HW-RB10	06-Feb-90	09-Mar-90	31	OK	22-Feb-90	16	OK
RB-HW-RB11	07-Feb-90	09-Mar-90	30	OK	22-Feb-90	15	OK
RB-HW-RB12	09-Feb-90	08-Mar-90	27	OK	22-Feb-90	13	OK
RB-HW-RB13	16-Feb-90	10-Mar-90	22	OK	27-Feb-90	11	OK
RB-HW-FB1(DI)	18-Jan-90	06-Feb-90	19	OK	01-Feb-90	14	OK
RB-HW-FB2(ST)	18-Jan-90	06-Feb-90	19	OK	01-Feb-90	14	OK
RB-HW-FB3(DT)	22-Jan-90	12-Feb-90	21	OK	01-Feb-90	10	OK
RB-HW-FB4(DI)	22-Jan-90	12-Feb-90	21	OK	01-Feb-90	10	OK
RB-HW-FB5(DI)	29-Jan-90	13-Feb-90	15	OK	06-Feb-90	8	OK
RB-HW-FB6(DT)	29-Jan-90	13-Feb-90	15	OK	06-Feb-90	8	OK
RB-HW-FB7(ST)	06-Feb-90	09-Mar-90	31	OK	22-Feb-90	16	OK
RB-HW-FB8(DI)	06-Feb-90	09-Mar-90	31	OK	22-Feb-90	16	OK
RB-HW-FB9(DI)	16-Feb-90	10-Mar-90	22	OK	27-Feb-90	11	OK
RB-HW-FB10(ST)	16-Feb-90	10-Mar-90	22	OK	27-Feb-90	11	OK

Table D-2
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
WATER ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	CLP VOLATILE ORGANICS			CLP BASE NEUTRAL SEMI-VOLATILE ORGANICS					
		ANALYZED	# of days	(14 days)	EXTRACTED	# of days	(7 days)	ANALYZED	# of days	(40 days)
RB-HW-TB1	22-Jan-90	10-Feb-90	19	*OVER*	--	--		--	--	
RB-HW-TB2	23-Jan-90	26-Jan-90	3	OK	--	--		--	--	
RB-HW-TB3	24-Jan-90	27-Jan-90	3	OK	--	--		--	--	
RB-HW-TB4	25-Jan-90	27-Jan-90	2	OK	--	--		--	--	
RB-HW-TB5	26-Jan-90	01-Feb-90	6	OK	--	--		--	--	
RB-HW-TB6	29-Jan-90	01-Feb-90	3	OK	--	--		--	--	
RB-HW-TB7	30-Jan-90	01-Feb-90	2	OK	--	--		--	--	
RB-HW-TB8	31-Jan-90	01-Feb-90	1	OK	--	--		--	--	
RB-HW-TB9	06-Feb-90	--	--		--	--		--	--	
RB-HW-TB10	06-Feb-90	12-Feb-90	6	OK	--	--		--	--	
RB-HW-TB11	07-Feb-90	13-Feb-90	6	OK	--	--		--	--	
RB-HW-TB12	07-Feb-90	13-Feb-90	6	OK	--	--		--	--	
RB-HW-TB13	09-Feb-90	14-Feb-90	5	OK	--	--		--	--	
RB-HW-TB14	16-Feb-90	22-Feb-90	6	OK	--	--		--	--	
RB-HW-TB15	16-Feb-90	22-Feb-90	6	OK	--	--		--	--	

(1) Holding time is measured from Validated Time of Sample Receipt (VTSR), which is assumed to be (1) day after the sample was collected.

Table D-2
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
WATER ANALYSIS COMPLETENESS

SAMPLE ID	DATE SAMPLED	PRIORITY POLLUTANT METALS					
		COMPLETED	# of days	(6 mos.)	MERCURY	# of days	(20 days)
RB-HW-TB1	22-Jan-90	--	--	--	--	--	--
RB-HW-TB2	23-Jan-90	--	--	--	--	--	--
RB-HW-TB3	24-Jan-90	--	--	--	--	--	--
RB-HW-TB4	25-Jan-90	--	--	--	--	--	--
RB-HW-TB5	26-Jan-90	--	--	--	--	--	--
RB-HW-TB6	29-Jan-90	--	--	--	--	--	--
RB-HW-TB7	30-Jan-90	--	--	--	--	--	--
RB-HW-TB8	31-Jan-90	--	--	--	--	--	--
RB-HW-TB9	06-Feb-90	--	--	--	--	--	--
RB-HW-TB10	06-Feb-90	--	--	--	--	--	--
RB-HW-TB11	07-Feb-90	--	--	--	--	--	--
RB-HW-TB12	07-Feb-90	--	--	--	--	--	--
RB-HW-TB13	09-Feb-90	--	--	--	--	--	--
RB-HW-TB14	16-Feb-90	--	--	--	--	--	--
RB-HW-TB15	16-Feb-90	--	--	--	--	--	--

(1) Holding time is measured from Validated Time of Sample Receipt (VTSR), which is assumed to be (1) day after the sample was collected.

Table D–3
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
RANGB BLANK ANALYSIS RESULTS

SAMPLE ID LOCATION	DATE SAMPLED	VOLATILE ORGANICS CLP	SEMI–VOLATILE ORGANICS CLP	PRIORITY POLLUTANT METALS CLP
		RINSE BLANKS		
RB–HW–RB1	18–Jan–90	--	ND	Cadmium (2.0 ug/L)B Copper (6.0 ug/L)B Lead (2.3 ug/L)B Mercury (.11 ug/L)B Zinc (8.0 ug/L)B
RB–HW–RB2	22–Jan–90	Methylene_Chloride (8 ug/L)B Chloroform (2 ug/L)J 1,1,1–Trichloroethane (4 ug/L)J	ND	Copper (13.0 ug/L)B Lead (14.8 ug/L) Zinc (17.0 ug/L)B
RB–HW–RB4	24–Jan–90	Methylene_Chloride (10 ug/L)B Acetone (8 ug/L)J Chloroform (3 ug/L)J 1,1,1–Trichloroethane (1 ug/L)J	ND	Lead (3.0 ug/L) Mercury (.29 ug/L) Zinc (20.0 ug/L)
RB–HW–RB5	25–Jan–90	Methylene_Chloride (14 ug/L)B Chloroform (3 ug/L)J 1,1,1–Trichloroethane (1 ug/L)J	--	--
RB–HW–RB7	29–Jan–90	Methylene_Chloride (9 ug/L)B Acetone (13 ug/L)J Chloroform (2 ug/L)J	--	Lead (2.8 ug/L)B Selenium Zinc (7.0 ug/L)B

Table D-3
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
RANGB BLANK ANALYSIS RESULTS

SAMPLE ID LOCATION	DATE SAMPLED	VOLATILE ORGANICS CLP	SEMI-VOLATILE ORGANICS CLP	PRIORITY POLLUTANT METALS CLP
RB-HW-RB6	26-Jan-90	Methylene_Chloride (11 ug/L)B Acetone (6 ug/L)J Chloroform (2 ug/L)J	--	Lead (2.6 ug/L)B Zinc (8.0 ug/L)B
RB-HW-RB8	30-Jan-90	Methylene_Chloride (13 ug/L)B Acetone (14 ug/L)J Chloroform (2 ug/L)J	ND	Lead (3.2 ug/L) Zinc (9.0 ug/L)B
RB-HW-RB9	31-Jan-90	Methylene_Chloride (12 ug/L)B Chloroform (2 ug/L)J	ND	Lead (5.5 ug/L) Mercury (.23 ug/L) Zinc (8.0 ug/L)B
RB-HW-RB12	09-Feb-90	Methylene_Chloride (11 ug/L) Chloroform (3 ug/L)J	ND	Lead (3.9 ug/L) Zinc (12.0 ug/L)
RB-HW-RB10	06-Feb-90	ND	--	Copper (3.0 ug/L) Zinc (7.0 ug/L)B
RB-HW-RB11	06-Feb-90	ND	--	Zinc (4 ug/L)B Lead (3.3 ug/L)
RB-HW-RB13	16-Feb-90	Acetone (10 ug/L)J	ND	Lead (2.1 ug/L)B Zinc (4 ug/L)B
RB-HW-RB13 Filtered		--	--	Lead (2.3 ug/L)B Zinc (7.0 ug/L)B

Table D-3
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
RANGB BLANK ANALYSIS RESULTS

SAMPLE ID LOCATION	DATE SAMPLED	VOLATILE ORGANICS CLP	SEMI-VOLATILE ORGANICS CLP	PRIORITY POLLUTANT METALS CLP
		FIELD BLANKS		
RB-HW-FB1 DI	18-Jan-90	--	ND	Copper (7.0 ug/L)B Lead (2.5 ug/L)B Thallium (.90 ug/L)B Zinc (17.0 ug/L)B
RB-HW-FB2 ST	18-Jan-90	--	ND	Arsenic (2.4 ug/L)B Copper (9.0 ug/L)B Zinc (13.0 ug/L)B Lead (5.8 ug/L) Thallium (1.5 ug/L)BW
RB-HW-FB3 DT	22-Jan-90	Chloroform (4 ug/L)J 1,1,1-Trichloroethane (9 ug/L) Bromodichloromethane (9 ug/L) Dibromochloromethane (14 ug/L) Bromoform (7 ug/L)	ND	Copper (10.0 ug/L)B Lead (3.1 ug/L) Zinc (274. ug/L)
RB-HW-FB4 DI	22-Feb-90	Methylene_Chloride (15 ug/L)B Acetone (16 ug/L)J Chlorform (4 ug/L)J 1,1,1-Trichloroethane (7 ug/L) Bromodichloromethane (9 ug/L)	ND	Lead (2.8 ug/L)B Zinc (20.0 ug/L)

Table D-3
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
RANGB BLANK ANALYSIS RESULTS

SAMPLE ID LOCATION	DATE SAMPLED	VOLATILE ORGANICS CLP	SEMI-VOLATILE ORGANICS CLP	PRIORITY POLLUTANT METALS CLP
RB-HW-FB5 DI	29-Jan-90	Methylene_Chloride (11 ug/L)B Acetone (15 ug/L)J Chlorform (2 ug/L)J	--	Arsenic (1.6 ug/L)B Lead (2.5 ug/L)B
RB-HW-FB6 DT	29-Jan-90	Acetone (5 ug/L)J Chloroform (3 ug/L)J Bromodichloromethane (8 ug/L) Dibromochloromethane (11 ug/L) Bromoform (5 ug/L)J	--	Arsenic (1.5 ug/L)B Copper (9.0 ug/L)B Lead (15.4 ug/L) Zinc (391. ug/L)B
RB-HW-FB7 ST	06-Feb-90	Chloroform (13 ug/L) Bromodichloromethane (7 ug/L) Dibromochloromethane (4 ug/L)J	ND	Arsenic (1.5 ug/L)B Copper (23.0 ug/L)B Lead (4.3 ug/L) Zinc (19.0 ug/L)B
RB-HW-FB8 DI	06-Feb-90	Methylene_Chloride (21 ug/L) Chloroform (6 ug/L) 1,1,1-Trichloroethane (2 ug/L)J Benzene (2 ug/L)J	ND	Lead (3.6 ug/L) Zinc (8 ug/L)B

Table D-3
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
RANGB BLANK ANALYSIS RESULTS

SAMPLE ID LOCATION	DATE SAMPLED	VOLATILE ORGANICS CLP	SEMI-VOLATILE ORGANICS CLP	PRIORITY POLLUTANT METALS CLP
RB-HW-FB10 ST	16-Feb-90	Methylene_Chloride (4 ug/L)J Chloroform (11 ug/L) 1,1,1-Trichloroethane (8 ug/L) Bromodichloromethane (5 ug/L) Dibromochloromethane (3 ug/L)J	ND	Arsenic (1.6 ug/L)B Copper (14 ug/L)B Lead (4.7 ug/L) Zinc (17 ug/L)B
RB-HW-FB9	16-Feb-90	--	ND	Lead (2.4 ug/L) Zinc (9.0 ug/L)B

Table D-3
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
RANGB BLANK ANALYSIS RESULTS

SAMPLE ID LOCATION	DATE SAMPLED	VOLATILE ORGANICS CLP	SEMI-VOLATILE ORGANICS CLP	PRIORITY POLLUTANT METALS CLP
		TRIP BLANKS		
RB-HW-TB1	26-Jan-90	Methylene_Chloride (13 ug/L)B	--	--
RB-HW-TB3	24-Jan-90	Methylene_Chloride (12 ug/L)B Acetone (15 ug/L)J	--	--
RB-HW-TB4	24-Jan-90	Methylene_Chloride (22 ug/L)B Acetone (26 ug/L)J 1,1,1-Trichloroethane (1 ug/L)J	--	--
RB-HW-TB6	29-Jan-90	Methylene_Chloride (9 ug/L)B	--	--
RB-HW-TB5	01-Feb-90	Methylene_Chloride (18 ug/L)B	--	--
RB-HW-TB7	30-Jan-90	Methylene_Chloride (13 ug/L)B	--	--
RB-HW-TB8	31-Jan-90	Methylene_Chloride (16 ug/L)B Acetone (8 ug/L)J	--	--
RB-HW-TB13	09-Feb-90	Methylene_Chloride (6 ug/L)	--	--
RB-HW-TB9	09-Feb-90	Methylene_Chloride (8 ug/L)	--	--
RB-HW-TB14	16-Feb-90	Methylene_Chloride (10 ug/L)	--	--
RB-HW-TB15	16-Feb-90	ND	--	--

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MWVM10900210A	10-Feb-90	VOC	METHYLENE CHLORIDE (5ug/L)J	RB-HW-TB9 RB-HW-MW3-GW2 RB-HW-MW1-GW2 RB-HW-MW4-GW1 RB-HW-FB7
MWVM1900212A	12-Feb-90	VOC	METHYLENE CHLORIDE (4ug/L)J	RB-HW-MW2-GW2 RB-HW-MW6-GW1 RB-HW-MW7-GW1 RB-HW-MW8-GW1 RB-HW-FB8 RB-HW-RB10 RB-HW-TB10
MWVM1900213A	13-Feb-90	VOC	METHYLENE CHLORIDE (6ug/L)	RB-HW-MW2-GW2MS RB-HW-MW2-GW2MSD RB-HW-TB12 RB-HW-D9 RB-HW-TB11 RB-HW-RB11 RB-HW-MW1-GW2 RB-HW-D8
MWVM1900222A	22-Feb-90	VOC	METHYLENE CHLORIDE (5ug/L)J	RB-HW-MW9-GW1 RB-HW-FB10 RB-HW-TB14 RB-HW-RB13 RB-HW-FB9 RB-HW-TB15
MWBNA900212	13-Feb-90	SVOC	--	RB-HW-MW4-GW1 RB-HW-D8MS RB-HW-D8MSD RB-HW-MW1-GW2 RB-HW-FB7 RB-HW-FB8 RB-HW-RB10 RB-HW-MW2-GW2 RB-HW-MW6-GW1 RB-HW-MW7-GW1 RB-HW-RB11 RB-HW-MW8-GW1

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MWBNA900213	14-Feb-90	SVOC	--	RB-HW-MW3-GW2
				RB-HW-D9
MWBNA900221	21-Feb-90	SVOC	--	RB-HW-FB9
				RB-HW-RB13
				RB-HW-MW9-GW1
				RB-HW-FB10
MWBNA900124B	24-Jan-90	SVOC	--	RB-HW-FB3
				RB-HW-FB4
				RB-HW-FB2
MSBNA900125A	25-Jan-90	SVOC	--	RB-HW-SU27MS
				RB-HW-AB2-SS2
				RB-HW-AB1-SS1
				RB-HW-AB1-SS2
				RB-HW-AB2-SS1
				RB-HW-AB2-SS2
				RB-HW-AB5-SS2
				RB-HW-AB8-SS1
				RB-HW-AB8-SS2
				SPIKE-BLANK
				RB-HW-AB3-SS1
				RB-HW-AB3-SS2
				RB-HW-AB4-SS1
				RB-HW-AB4-SS2
				RB-HW-AB6-SS1
				RB-HW-AB6-SS1
				RB-HW-AB7-SS1
				RB-HW-AB7-SS2

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MSBNA900126	29-Jan-90	SVOC	--	SPIKE-BLANK RB-HW-SU25 RB-HW-SU33 RB-HW-AB9-SS1 RB-HW-AB9-SS2 RB-HW-AB10-SS1 RB-HW-AB10-SS2 RB-HW-AB12-SS3 RB-HW-AB12-SS7 RB-HW-AB15-SS3 RB-HW-AB15-SS8 RB-HW-AB14-SS2 RB-HW-AB14-SS7 RB-HW-D5 RB-HW-AB15-SS3
MSBNA900130	30-Jan-90	SVOC	--	RB-HW-FB5 RB-HW-FB6 RB-HW-FB7 RB-HW-FB6 RB-HW-FB4
MSBNA900131	31-Jan-90	SVOC	--	RB-HW-MW4-SS2 RB-HW-MW4-SS3 RB-HW-AB11-SS7 RB-HW-AB11-SS4 RB-HW-AB11-SS4MS RB-HW-AB11-SS4MSD RB-HW-MW6-SS2 RB-HW-MW6-SS3 RB-HW-MW7-SS2 RB-HW-MW7-SS3 RB-HW-MW8-SS2 RB-HW-MW8-SS3 RB-HW-D6 RB-HW-D7 RB-HW-AB5-SS1
MWBNA900201	05-Jan-90	SVOC	bis(2-ETHYLHEXYL) PHTHALATE (85ug/L)	RB-HW-RB8 RB-HW-RB9

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MWBNA900209	12-Feb-90	SVOC	--	RB-HB-SU49-SS3
				RB-HB-SB4-SS1
				RB-HB-MW5-SS2
				RB-HB-MW5-SS3
MWBNA900216	16-Feb-90	SVOC	--	RB-HW-RB12
MSBNA900220	21-Feb-90	SVOC	--	RB-HW-MW9-SS2
				RB-HW-MW9-SS3
MSBNA900119A	19-Jan-90	SVOC	--	RB-HW-SV27
				RB-HW-SV28
				RB-HW-SV23
				RB-HW-SV26
				RB-HW-SV19
				RB-HW-SV30
				SPIKE BLANK
				RB-HW-SV29
				RB-HW-SV22
				RB-HW-SV24
				RB-HW-SV31
				RB-HW-SV32
MSBNA900122A	22-Jan-90	SVOC	--	RB-HW-SV37
				RB-HW-SV43
				RB-HW-SV42
				RB-HW-SV20
				RB-HW-SV34
				RB-HW-SV35
				RB-HW-SV36
				RB-HW-SV38
				RB-HW-SV39
				RB-HW-SV40
				RB-HW-SV41
				RB-HW-SV44
				RB-HW-SV45
				RB-HW-SV46
				RB-HW-SV47
				RB-HW-SV48
				RB-HW-D1
				RB-HW-D2
				RB-HW-D3

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MSBNA900125A	25-Jan-90	SVOC	--	RB-HW-SU27MS RB-HW-SU27MSD RB-HW-SU21
MWBNA900123	23-Jan-90	SVOC	DIETHYPHTHALATE (15ug/L)	SPIKE BLANK SPIKE BLANKB RB-HW-FB1 RB-HW-FB2 RB-HW-RB1
MSVM2900125A	25-Jan-90	VOC	METHYLENE CHLORIDE (10ug/L) ACETONE (10ug/L)J 2-BUTANONE (6ug/L)J 4-METHYL-2-PENTANONE (3ug/L)J TETRACHLOLOETHENE (1ug/L)J TOLUENE (1ug/L)J ETHYLBENZENE (1ug/L)J	RB-HW-AB5-SS1 RB-HW-AB5-SS2 RB-HW-AB8-SS1 RB-HW-AB8-SS2 RB-HW-AB1-SS1
MWVM1900126A	26-Jan-90	VOC	METHYLENE CHLORIDE (8ug/L) ACETONE (24ug/L)J 1,1,1-TRICHLOROETHANE (4ug/L)J	RB-HW-FB3 RB-HW-FB4 RB-HW-RB2 RB-HW-TB1 RB-HW-TB2 RB-HW-AB1-SS2
MSVM2900126A	26-Jan-90	VOC	METHYLENE CHLORIDE (4ug/L)J ACETONE (3ug/L)J 2-BUTANONE (4ug/L)J	RB-HW-AB2-SS1 RB-HW-AB2-SS2 RB-HW-AB6-SS1 RB-HW-AB6-SS2

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MWVM1900127A	27-Jan-90	VOC	METHYLENE CHLORIDE (10ug/L) ACETONE (8ug/L)J	RB-HW-RB4 RB-HW-TB3 RB-HW-RB5 RB-HW-TB4
MSVM2900129A	08-Feb-90	VOC	METHYLENE CHLORIDE (10ug/L) ACETONE (21ug/L)J 2-BUTANONE (5ug/L)J TOLUENE (1ug/L)J	RB-HW-AB4-SS1 RB-HW-AB4-SS2
MSVM1900130A	30-Jan-90	VOC	METHYLENE CHLORIDE (7ug/L) ACETONE (25ug/L)J	RB-HW-AB13-SS7 RB-HW-AB13-SS5 RB-HW-AB12-SS7 RB-HW-AB12-SS3 RB-HW-AB14-SS7 RB-HW-D5
MSVM2900130A	30-Jan-90	VOC	METHYLENE CHLORIDE (8ug/L) ACETONE (16ug/L)J 2-BUTANONE (4ug/L)J	RB-HW-AB7-SS1 RB-HW-AB7-SS2 RB-HW-AB9-SS1 RB-HW-AB9-SS2 RB-HW-AB3-SS1
MSVM1900131A	31-Jan-90	VOC	METHYLENE CHLORIDE (8ug/L) ACETONE (17ug/L)J	RB-HW-AB12-SS7 RB-HW-AB15-SS8 RB-HW-D4 RB-HW-AB12-SS7B

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MSVM2900131A	31-Jan-90	VOC	METHYLENE CHLORIDE (8ug/L) ACETONE (10ug/L)J 2-BUTANONE (4ug/L)J	RB-HW-AB4-SS1 RB-HW-AB10-SS1 RB-HW-AB10-SS2 RB-HW-AB3-SS2 RB-HW-MW4-SS2
MWV1900201A	01-Feb-90	VOC	METHYLENE CHLORIDE (11ug/L) ACETONE (21ug/L)J	RB-HW-FB5 RB-HW-FB6 RB-HW-TB6 RB-HW-RB7 RB-HW-TB5 RB-HW-RB6 RB-HW-RB8 RB-HW-TB7 RB-HW-RB9 RB-HW-TB8
MSV2900201A	01-Feb-90	VOC	METHYLENE CHLORIDE (10ug/L) ACETONE (11ug/L)J 2-BUTANONE (5ug/L)J	RB-HW-MW4-SS3 RB-HW-AB11 RB-HW-D7 RB-HW-MW8-SS3 RB-HW-MW8-SS2 RB-HW-MW7-SS3
MSVM2900202A	02-Feb-90	VOC	METHYLENE CHLORIDE (19ug/L) ACETONE (7ug/L)J 2-BUTANONE (4ug/L)J 2-HEXANONE (2ug/L)J	RB-HW-MW6-SS2 RB-HW-MW6-SS3

TABLE D-4
RICKENBACKER AIR NATIONAL GUARD BASE
HAZARDOUS WASTE STORAGE AREA
METHOD BLANK TESTING

METHOD BLANK ID NUMBER	DATE ANALYZED	METHOD	COMPOUNDS DETECTED	SAMPLES ASSOCIATED
MSVM1900205A	05-Feb-90	VOC	METHYLENE CHLORIDE (1200ug/L)	RB-HW-AB14-SS2 RB-HW-MW5-SS3 RB-HW-D6130 RB-HW-D6MS RB-HW-D6MSD RB-HW-MW7-SS2
MSVM2900205A	05-Feb-90	VOC	METHYLENE CHLORIDE (9ug/L) ACETONE (6ug/L)J 2-BUTANONE (6ug/L)J	RB-HW-MW6-SS3 RB-HW-MW5-SS2 RB-HW-AB15-SS3
MSVM2900208A	08-Feb-90	VOC	METHYLENE CHLORIDE (7ug/L) ACETONE (4ug/L)J	RB-HW-AB11-SS4 RB-HW-AB11-SS4MS RB-HW-AB11-SS4MSD RB-HW-06
MWVM1900214A	14-Feb-90	VOC	--	RB-HW-TB13 RB-HW-RB12
MWVM2900215A	15-Feb-90	VOC	METHYLENE CHLORIDE (5ug/L)J 2-BUTANONE (6ug/L)J VINYL ACETATE (1ug/L)J 2-HEXANONE (1ug/L)J 4-METHYL-PENTANONE (2ug/L)J TOLUENE (1ug/L)J	RB-HW-MW9-SS2 RB-HW-MW9-SS3

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D1	RB-HW-SU28	RPD
Volatile Organics:			
Vinyl Chloride	--	--	--
Methylene_Chloride	--	--	--
Acetone	--	--	--
Trichlorofluoromethane	--	--	--
1,1-Dichloroethane	--	--	--
trans-1,2-Dichloroethene	--	--	--
2-Butanone	--	--	--
Trichloroethene	--	--	--
Benzene	--	--	--
Toluene	--	--	--
Ethylbenzene	--	--	--
m/p-Xylene	--	--	--
o-Xylene	--	--	--
Semi-Volatile Organics:			
Fluoranthene	170 J	< 420	67
Pyrene	190 J	< 420	67
Benzo(b)Fluoranthene	160 J	< 420	67
Diethylphthalate	< 410	< 420	
Chrysene	< 410	< 420	
Benzo(a)Pyrene	< 410	< 420	
Metals:			
Antimony	--	--	--
Arsenic	--	--	--
Berylium	--	--	--
Cadmium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead GF	--	--	--
Lead ICP	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Selenium	--	--	--
Silver	--	--	--
Thallium	--	--	--
Zinc	--	--	--

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D2	RB-HW-SU41	RPD
Volatile Organics:			
Vinyl Chloride	--	--	--
Methylene_Chloride	--	--	--
Acetone	--	--	--
Trichlorofluoromethane	--	--	--
1,1-Dichloroethane	--	--	--
trans-1,2-Dichloroethene	--	--	--
2-Butanone	--	--	--
Trichloroethene	--	--	--
Benzene	--	--	--
Toluene	--	--	--
Ethylbenzene	--	--	--
m/p-Xylene	--	--	--
o-Xylene	--	--	--
Semi-Volatile Organics:			
Fluoranthene	< 410	330 J	47
Pyrene	130 J	< 300	14
Benzo(b)Fluoranthene	< 410	< 420	
Diethylphthalate	< 410	240 J	16
Chrysene	< 410	200 J	2
Benzo(a)Pyrene	< 410	170 J	19
Metals:			
Antimony	--	--	--
Arsenic	--	--	--
Berylium	--	--	--
Cadmium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead GF	--	--	--
Lead ICP	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Selenium	--	--	--
Silver	--	--	--
Thallium	--	--	--
Zinc	--	--	--

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D3	RB-HW-SU42	RPD
Volatile Organics:			
Vinyl Chloride	--	--	--
Methylene_Chloride	--	--	--
Acetone	--	--	--
Trichlorofluoromethane	--	--	--
1,1-Dichloroethane	--	--	--
trans-1,2-Dichloroethene	--	--	--
2-Butanone	--	--	--
Trichloroethene	--	--	--
Benzene	--	--	--
Toluene	--	--	--
Ethylbenzene	--	--	--
m/p-Xylene	--	--	--
o-Xylene	--	--	--
Semi-Volatile Organics:			
Fluoranthene	< 410	160 J	25
Pyrene	200 J	190 J	5
Benzo(b)Fluoranthene	240 J	< 440	46
Diethylphthalate	200 J	< 440	29
Chrysene	< 410	< 440	200
Benzo(a)Pyrene	< 410	< 440	200
Metals:			
Antimony	--	--	--
Arsenic	--	--	--
Berylium	--	--	--
Cadmium	--	--	--
Chromium	--	--	--
Copper	--	--	--
Lead GF	--	--	--
Lead ICP	--	--	--
Mercury	--	--	--
Nickel	--	--	--
Selenium	--	--	--
Silver	--	--	--
Thallium	--	--	--
Zinc	--	--	--

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D4	RB-HW-AB15-SS8	RPD
Volatile Organics:			
Vinyl Chloride	< 11	< 11	
Methylene_Chloride	15 B	42 J	95
Acetone	28 J	43 J	42
Trichlorofluoromethane	< 11	< 11	
1,1-Dichloroethane	< 6	< 6	
trans-1,2-Dichloroethene	9	< 6	
2-Butanone	< 115	< 111	
Trichloroethene	250 D	4 J	194
Benzene	< 6	< 6	
Toluene	< 6	< 6	
Ethylbenzene	< 6	< 6	
m/p-Xylene	< 6	< 6	
o-Xylene	< 6	< 6	
Semi-Volatile Organics:			
Fluoranthene	< 380	< 370	
Pyrene	< 380	< 370	
Benzo(b)Fluoranthene	< 380	< 370	
Diethylphthalate	< 380	< 370	
Chrysene	< 380	< 370	
Benzo(a)Pyrene	< 380	< 370	
Metals:			
Antimony	2.8 UN	2.6 UN	7
Arsenic	13.4	14.5	8
Berylium	0.49	0.72	38
Cadmium	0.28 B	0.13 B	73
Chromium	13.6	18.4	30
Copper	22.4 N	19.9 N	12
Lead GF	--	--	
Lead ICP	22.2 N*	13.2 N*	51
Mercury	0.057 U	0.16	95
Nickel	27.4	30.3	10
Selenium	0.36	0.31	15
Silver			
Thallium	0.35 UNW	0.094 UNW	115
Zinc	91.1 N	68.8 N	28

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D5	RB-HW-AB14-SS7	RPD
Volatile Organics:			
Vinyl Chloride	< 12	< 11	
Methylene_Chloride	10 B	8 J	22
Acetone	27 J	18 J	40
Trichlorofluoromethane	< 12	< 11	
1,1-Dichloroethane	< 6	< 6	
trans-1,2-Dichloroethene	< 6	< 6	
2-Butanone	< 116	< 111	
Trichloroethene	1 J	< 6	100
Benzene	5 J	6	18
Toluene	8	< 6	91
Ethylbenzene	< 6	< 6	
m/p-Xylene	< 6	< 6	
o-Xylene	< 6	< 6	
Semi-Volatile Organics:			
Fluoranthene	< 380	< 370	
Pyrene	< 380	< 370	
Benzo(b)Fluoranthene	< 380	< 370	
Diethylphthalate	< 380	< 370	
Chrysene	< 380	< 370	
Benzo(a)Pyrene	< 380	< 370	
Metals:			
Antimony	3.1 UN	3.2 UN	3
Arsenic	10.6 B	61.2	141
Berylium	0.46	0.32 B	36
Cadmium	0.15	0.16 B	6
Chromium	11.7	9.4	22
Copper	19.9 N	46 N	79
Lead GF	14.6 N*	22.9	44
Lead ICP	--	--	
Mercury	0.09	0.055	48
Nickel	22	15.3	36
Selenium	0.28	0.6	73
Silver			
Thallium	0.11 UNW	0.09 UNW	20
Zinc	66.1 N	73.6 N	11

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D6	RB-HW-MW6-SS3	RPD
Volatile Organics:			
Vinyl Chloride	< 11	59	
Methylene_Chloride	4 JB	31 B	154
Acetone	3 J	7 J	80
Trichlorofluoromethane	< 11	< 11	
1,1-Dichloroethane	< 6	< 6	
trans-1,2-Dichloroethene	< 6	1000 D	199
2-Butanone	< 115	7 J	157
Trichloroethene	< 6	40	172
Benzene	< 6	< 6	
Toluene	< 6	1 J	100
Ethylbenzene	< 6	< 6	
m/p-Xylene	< 6	< 6	
o-Xylene	< 6	< 6	
Semi-Volatile Organics:			
Fluoranthene	< 380	< 380	
Pyrene	< 380	< 380	
Benzo(b)Fluoranthene	< 380	< 380	
Diethylphthalate	< 380	< 380	
Chrysene	< 380	< 380	
Benzo(a)Pyrene	< 380	< 380	
Metals:			
Antimony	4 UN	3.9 UN	3
Arsenic	11.1 NS	11.3 N	2
Berylium	0.6	4.9	156
Cadmium	0.7	0.2 B	111
Chromium	17.3	14.5	18
Copper	19.5 *	21.6 *	10
Lead GF	9.6 N	15.1 NS	45
Lead ICP	--	--	
Mercury	0.058	0.057 U	2
Nickel	24.5	28.5	15
Selenium	0.47 N+	0.98 NS	70
Silver	0.66 U	0.65 U	2
Thallium	0.075 U	0.078 UW	4
Zinc	73.9	72.8	1

Table D-5
RICKENBACKER ANGB HAZARDOUS
WASTE STORAGE AREA
SOIL DUPLICATE COMPARISON

DUPLICATE SOIL SAMPLES	RB-HW-D7	RB-HW-MW7-SS3	RPD
Volatile Organics:			
Vinyl Chloride	< 13	< 13	
Methylene_Chloride	9 B	8 B	12
Acetone	22 J	19 J	15
Trichlorofluoromethane	1 J	< 13	
1,1-Dichloroethane	1 J	< 6	
trans-1,2-Dichloroethene	2 J	< 6	40
2-Butanone	9 J	3 J	100
Trichloroethene	8	< 6	91
Benzene	76	140	59
Toluene	< 6	4 J	29
Ethylbenzene	6 J	< 6	67
m/p-Xylene	8	< 6	91
o-Xylene	10	< 6	108
Semi-Volatile Organics:			
Fluoranthene	< 470	< 410	
Pyrene	< 470	< 410	
Benzo(b)Fluoranthene	< 470	< 410	
Diethylphthalate	< 470	< 410	
Chrysene	< 470	< 410	
Benzo(a)Pyrene	< 470	< 410	
Metals:			
Antimony	--	--	
Arsenic	--	--	
Berylium	--	--	
Cadmium	--	--	
Chromium	--	--	
Copper	--	--	
Lead GF	--	--	
Lead ICP	--	--	
Mercury	--	--	
Nickel	--	--	
Selenium	--	--	
Silver	--	--	
Thallium	--	--	
Zinc	--	--	

Table D-6
RICKENBACKER ANGB HAZARDOUS WASTE STORAGE AREA
WATER DUPLICATE COMPARISON

DUPLICATE WATER SAMPLES	RB-HW-D8	RB-HW-MW7-GW1	RPD	RB-HW-D9	RB-HW-MW8-GW1	RPD
Volatile Organics:	--	--		ND	ND	
Semi-Volatile Organics:						
2-Methylnaphthalene	--	--		5 J	5 J	0
Metals, total:						
Arsenic	1.8 B	17.9 B	163	--	--	
Beryllium	3 B	3.8 U	24	--	--	
Chromium	50	27 U	60	--	--	
Copper	102	31 U	107	--	--	
Lead	75.1 S	25.8	98	--	--	
Nickel	86	31.1 U	94	--	--	
Zinc	390	168 B	80	--	--	
Metals, dissolved:						
Arsenic	--	--		2.4 B	3.1 BW	25
Copper	--	--		6.0 B	6.0 U	0
Lead	--	--		16.4 S	6.0	93
Zinc	--	--		24.0	21.0	13

RPD = RELATIVE PERCENT DIFFERENCE